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JULY, 1958

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Precision Metal Molding

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INCLUDING DIE CASTINGS MAGAZINE

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DIE CASTINGS

INVESTMENT CASTINGS

PERMANENT MOLD CASTINGS

PLASTER MOLD CASTINGS

POWDER METALLURGY

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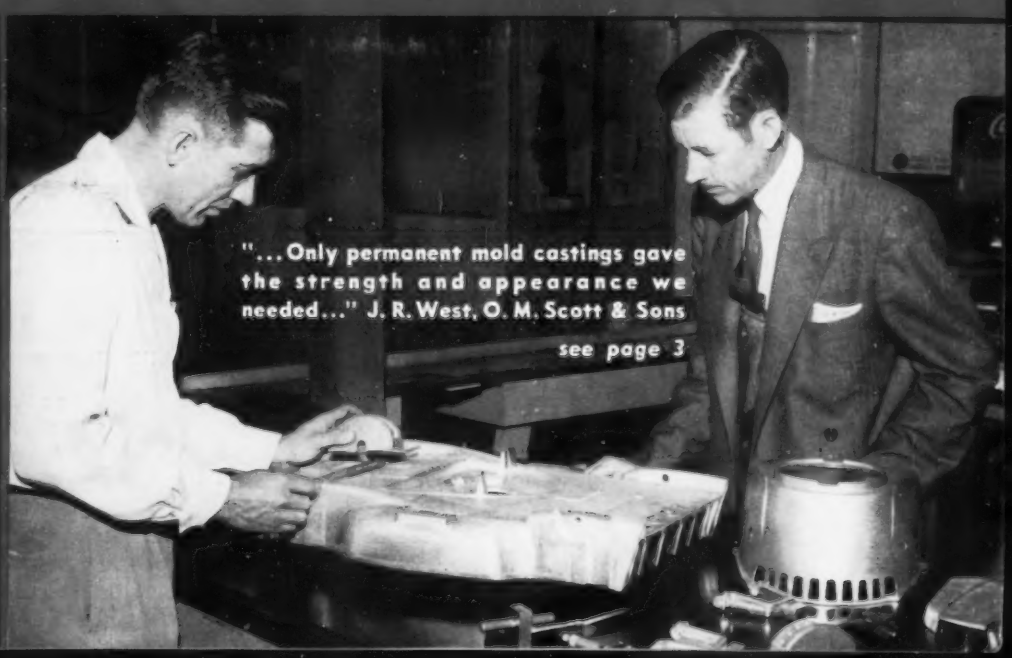

"...Only permanent mold castings gave the strength and appearance we needed..." J. R. West, O. M. Scott & Sons

see page 3

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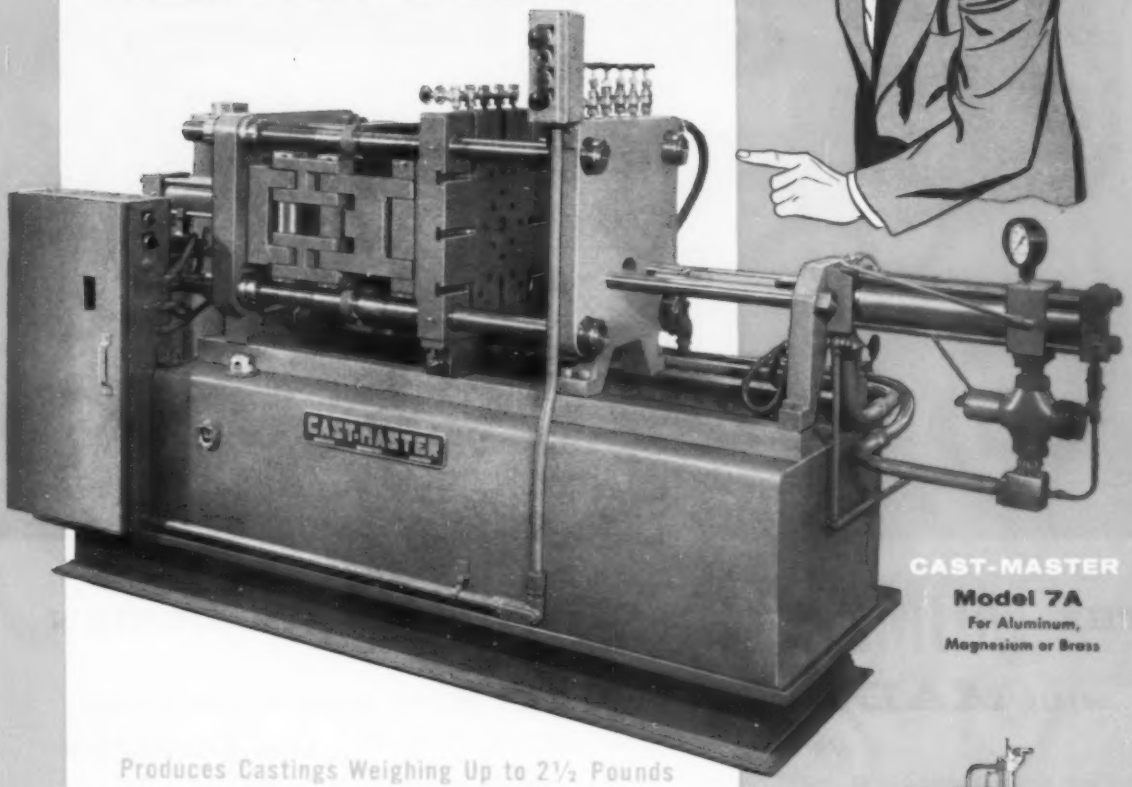

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IN THIS ISSUE

July 1958: Volume 16 Number 7

COVER

STRENGTH, CASTABILITY AND APPEARANCE were the primary considerations when O. M. Scott & Sons choose a method of making components for their electric lawn mower. Aluminum had to be the metal and ultimately permanent mold casting had to be the method of fabrication to give the qualities needed at a price that would make the mower competitive.

The cover picture shows Raymond Webb, left, superintendent of the mower plant and J. R. West, right, director, product development and testing, gauging some of the component castings. After more than a year's experience in mower manufacture, Mr. West said ". . . . we're glad that we chose Monarch permanent mold castings."

FEATURE ARTICLES

23 SAVE MONEY WITH SMALL INVESTMENT CASTINGS

The advantages of using small investment castings include saving machining costs, less scrap loss, and shorter production time.

24 CAST DIE CAVITIES — PART I

This method of making dies may allow the die casting process to break through into the alloy-fields now barred to it.

26 ARE YOU BUYING TOLERANCES YOU DON'T ACTUALLY NEED?

Sometimes it's possible to be too exact in specifications. Most of the time, this is because it has become a habit to expect close tolerances. Read this article and know what to ask of your foundryman.

28 PLANNING, DESIGNING AND PRODUCING CASTINGS:

By close cooperation between customer and foundry the best parts at the lowest cost are assured.

30 ELECTRIC MELTING AND HOLDING OF ALUMINUM

Clean, low cost melting and holding of aluminum can be secured through the use of induction melting furnaces.

32 WHEN YOU CAN — DESIGN FOR SINTERINGS!

By doing so, you can make it possible to manufacture a product at low cost, keep consumer prices at a competitive level, and insure sales that will be based in user-satisfaction.

35 DESIGN TIPS

Small design changes allow straight core pulls with lower tooling costs.

FINISHING SECTION

39 NOW! IMPROVED CORROSION RESISTANCE FOR PLATED ZINC DIE CASTINGS

There is a way to protect zinc die castings from the terrific corrosive action of wintertime salt-slush and slop. Read how it is accomplished by methods described in this article.

43 GLOSSARY OF BARREL FINISHING TERMS

The glossary approved by the National Barrel Finishers' Forum is printed in this month's issue of PMM. It is final, official, and complete.

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BETWEEN THE LINES

The editor's viewpoint on articles in current and forthcoming issues

THE EXPANDED USE OF DIE CASTINGS is a problem for both the user and the producer. Many times the cost of the tools to produce the die cast parts is the only deterrent. One possible solution may be in the use of cast dies. These tools can be made to such close tolerances that many are used as-cast. Others may require some light finishing. The first part of a two part article on cast dies starts on page 24 of this issue.

PROTECTIVE CHROMIUM plating as distinguished from decorative chromium plating seems to be here. As normally deposited, chromium is in a highly stressed state. The result is a network of fine cracks that permit electrolytic action between the chromium and the nickel undercoat. Pitting and ultimately corrossion result. A new method for depositing a ductile, crack free chromium layer is reported in this issue. This could mean a far wider application of plated zinc die castings than has been true in the past.

WHAT DOES PRECISE MEAN to the design engineer. Sometimes it means tolerances measured in millionths of an inch. Other times it means ± 1/16". This only means — don't ask for tolerances closer than you really need. A leader in the investment casting field explains why extra close tolerances and extra inspections will increase the cost of investment castings.

THERE'S SOMETHING NEW IN BARREL FINISHING as a report coming up will describe. For some finishing jobs a better finish can be secured when the media is made from sintered metal powders. Look for this article.

MORE DIE CASTINGS NEED SOME MACHINING, even if it is only simple drilling and tapping operations. No matter what machining job you have to do, our August finishing feature will show how to do it better and faster. Either special tools designed for high speed production or tooling built up from standard components will cut costs of these finishing operations.

THE DEVELOPMENT OF NEW ALLOYS that can be cast by one of the precision molding processes are always important to the designer. PRECISION METAL MOLDING was the first to call attention to the high strength alloy developed by North American Aviation. Now, another report on this alloy giving foundry experience with it is in preparation. Watch for it soon.

A COMMON LANGUAGE is a must for complete understanding when designer and any service organization discuss their problems. That's why we have published in this issue the approved glossary of terms for barrel finishing. The National Barrel Finishing Forum, representing a large segment of the barrel finishing industry has approved the glossary.

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machine

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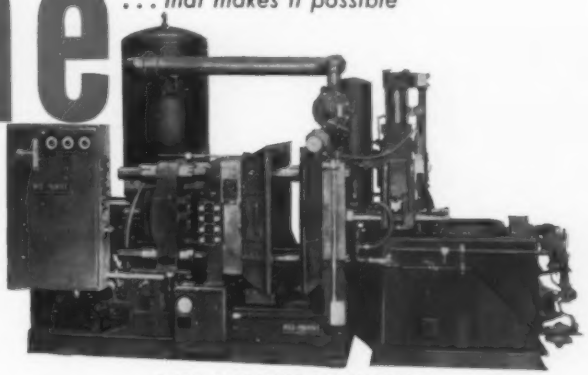

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The Ford Motor Company's Edsel, one of the most distinctive medium priced cars on the road. Its unusual horizontal taillight is a distinguishing feature produced in a two-cavity die by the REED VACUCAST system.

1958 EDSEL

product

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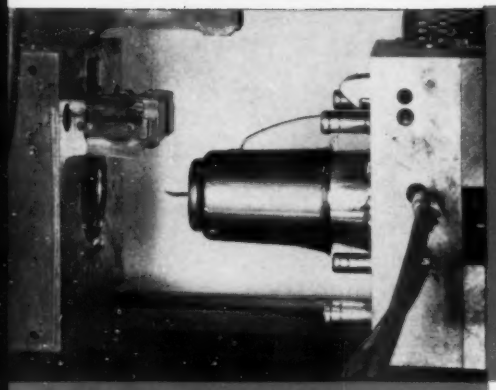
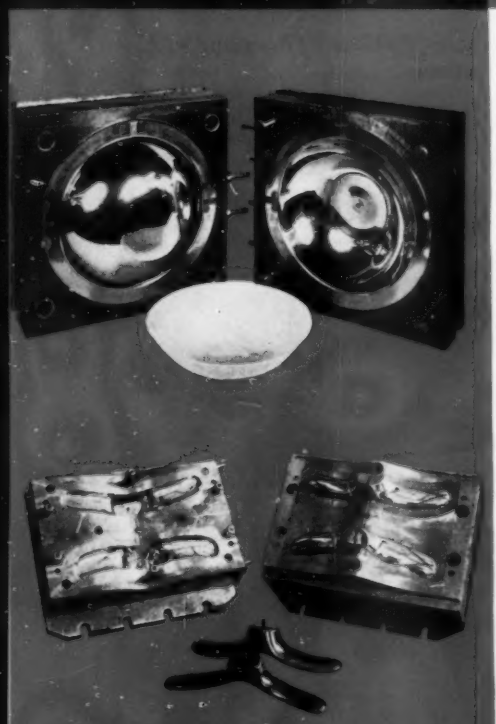


DIE STEELS

for
plastic molds
and die casting dies



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The Mold and Cavity die steel made with particular care to permit blemish-free, highly finished surfaces. Furnished heat treated to 300 Brinell or annealed. Very deep hardening —uniform throughout large sections. Very low movement when oil quenched. For lower finishing costs and longer die life, use MC!

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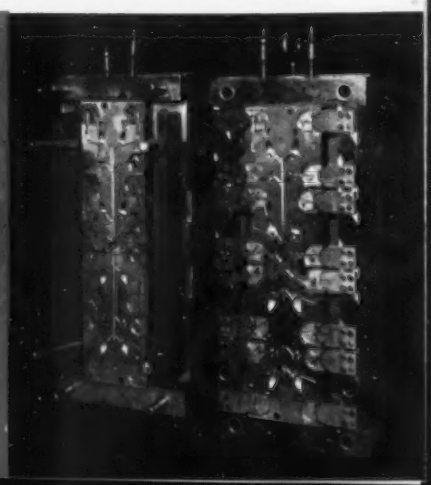
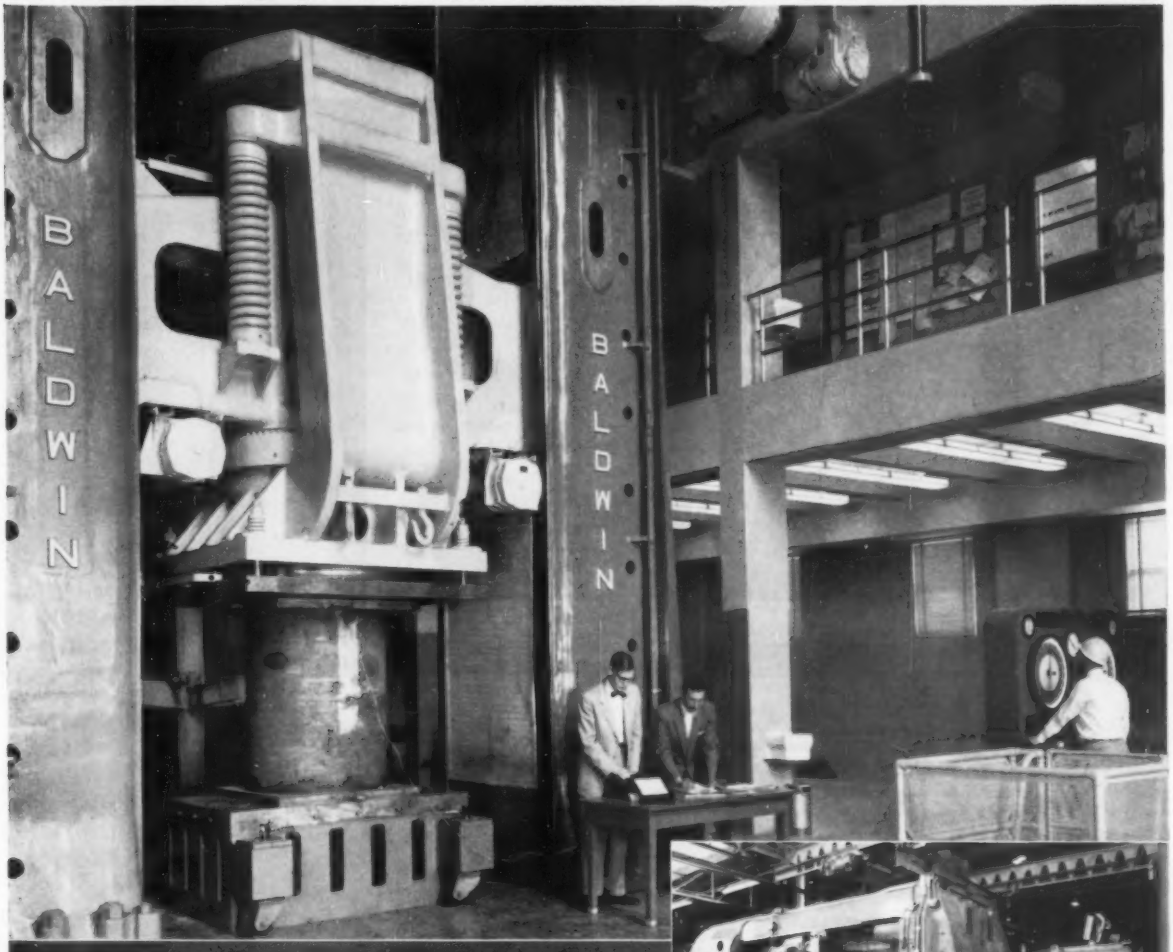
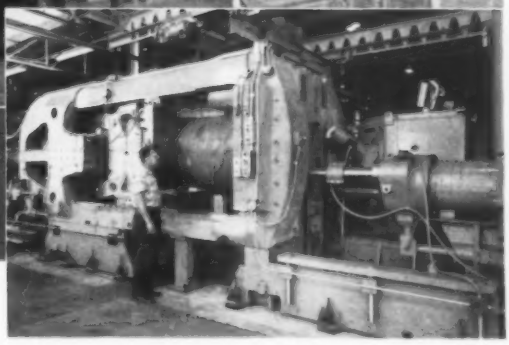


A NEW STEP IN LESTER STANDARDS



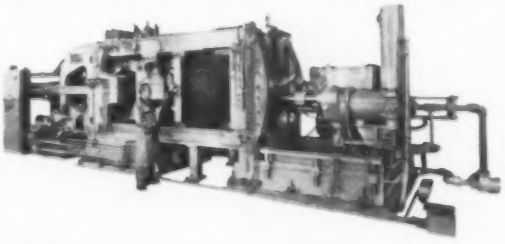
Read how 5,000,000 Lb. University Test Backs Up LESTER Locking Ratings...



A machined ring is squeezed between the jaws of a giant testing machine (capable of exerting 5 million pounds of pressure) at Lehigh University. Readings at various pressures are taken by an independent engineer. This ring is, in turn, locked between the platens of our machines and the comparison readings certify the clamping tonnage.

Why do we do it?

Because we know that the heart of controlling the quality of die cast parts is the ability of the machine to develop and *hold* its full rated locking tonnage. Only with the one-piece cast alloy frame, an exclusive feature of Lester machines, is this tonnage assured for the life of the machine. No torque, no twist, no wear, no adjustment. Just rigid, dependable, *certified* clamping tonnage.



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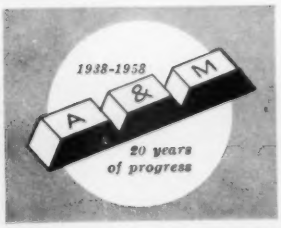
B SERVICE — Our metallurgists and engineers insure our metal working best for you by customizing it to your specific requirements.

C RELIABILITY — At any time, our metal is only as far away from you as your telephone. We maintain our own truck fleet to enable you to have metal when YOU want it.



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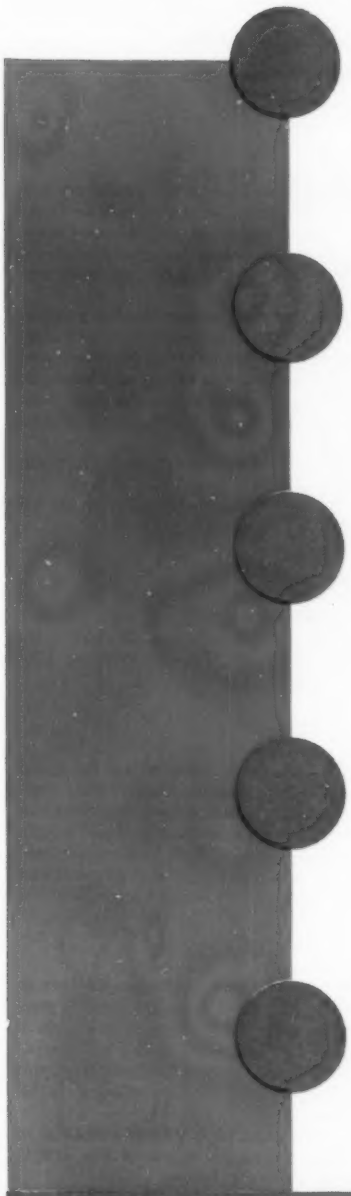
60 CYCLE INDUCTION MELTING



A famous metallurgist once wrote: "50% of all rejects can be traced to faulty melting and pouring." When molten metal is overheated, important alloy ingredients are lost by burning. Castings or billets may be porous from combustion gases absorbed by the molten metal. Frequently, unwanted alloy ingredients are picked up from the containers used in melting. If the temperature of molten metal flowing into a mold strays from the optimum, defective castings will result. In a quiet melt alloy ingredients may not dissolve properly, and the metal cast will not meet specifications. Finally, there is the problem of nonmetallics suspended in the melt which cause occlusions and other difficulties in the end product.

60 CYCLE INDUCTION MELTING, properly applied, is probably the biggest single step that can be taken to overcome these traditional melting problems. The method is unique in its combination of two factors: Heat is generated only in the molten metal, and the entire melt is stirred by electromagnetic pressure. Furthermore, high melting rates can be concentrated in a small space. —No part of the furnace is hotter than the metal. Combustion gases are absent and controlled atmospheres can be used. The container is constructed of refractories inert to the molten metal. Temperature control of unprecedented precision is inherent in the method. Electromagnetic stirring assures complete dissolving of all ingredients and a uniform alloy. Suspended nonmetallics are deposited in the electromagnetic pressure area.

These are basic reasons why 60 CYCLE INDUCTION MELTING has had such a spectacular growth in the postwar period. Modern plants require high production rates with controlled quality, yet can assign only a minimum of skilled labor to each operation. 60 CYCLE INDUCTION MELTING minimizes hard labor in melting. It enables process control to substantially decrease the effect of human error. Cost reductions are reflected throughout each step of fabrication of a casting or billet to its end use.

60 CYCLE INDUCTION MELTING, firmly established for thirty years as the predominant production method for melting brass, has recently been applied on a much larger scale. In the last ten years, as new furnace designs became available, the method has been rapidly adopted by many progressive companies in the fields of aluminum die casting, aluminum extrusion, aluminum wire, aluminum coating, leaded copper alloy casting, zinc die casting, and galvanizing of strip in the steel mills. Well over one thousand 60 CYCLE INDUCTION MELTING furnaces are now operating in these new fields.

Our 60 CYCLE INDUCTION MELTING furnace takes many different forms to meet the needs of all these industries. Unit production rates now range from 150 pounds to 40 tons per hour. We specialize in the development, design, and manufacture of standard and custom-built furnaces to meet each requirement. If there is a production melting problem in your operation which may benefit from a basic change in method, we should be glad to discuss the possibilities with you.

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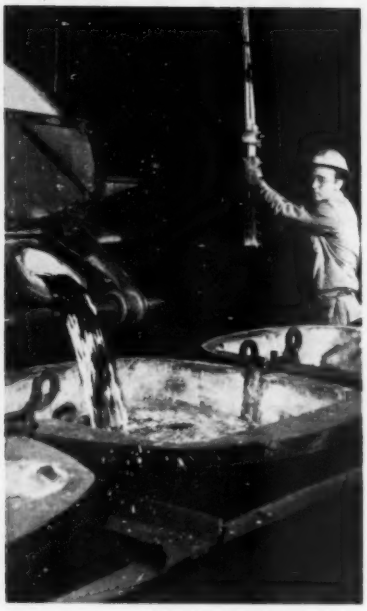


CASTING ABOUT

technical news of applications & processes involving precision metal moldings

AMERICA'S NEWEST ALUMINUM REDUCTION PLANT has a predicted annual capacity of 180,000 tons of primary aluminum when in full operation, according to The Ormet Corp. Owned jointly by the Olin Mathieson Chemical Corporation and Revere-Copper and Brass, Inc., the Ormet Corporation will then be the nation's fourth largest producer of aluminum. At left, a crane operator pours molten aluminum into 1000-lb. pig-molds from a 7000-lb. crucible.

Located between the Ohio towns of Clarington and Hannibal, Ormet also has a carbon plant. This was the first major unit to start production. Needed to supply rodded carbon annodes to energize pot-lines, it will turn out approximately 90,000 tons of carbon each year. Also scheduled for completion later this year is the aluminum rolling mill belonging to Olin Mathieson. It is adjacent to the Ormet reduction plant. When the two plants are in full production, they will employ 2200 people and have an annual payroll of more than $10,000,000.

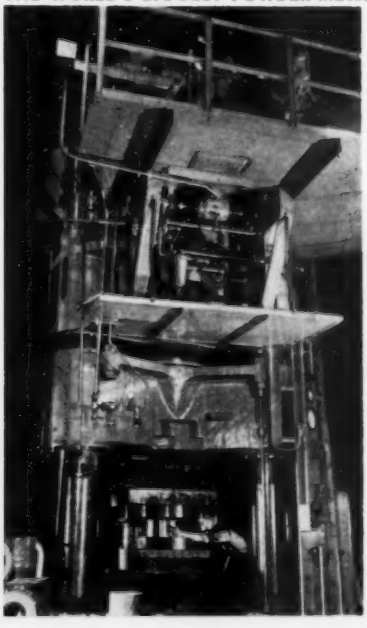
Ormet was formed nearly two years ago, to construct and operate primary aluminum production facilities for both Olin Mathieson and Revere.

Of the 180,000 tons of aluminum produced each year by Ormet, Olin Mathieson will receive 120,000 tons. Revere will get the other 60,000 tons.

USE OF TITANIUM IN MAKING AIRCRAFT by the Tempco Aircraft Corp. has jumped to a new monthly high of nearly 13 tons. Last year the Dallas, Texas, firm used nine tons each month in its planes, including the sections of the Lockheed C-130; Boeing B-52G Stratofortress; Pratt & Whitney J-57. All in all, Tempco uses more than 10,000 titanium parts monthly.

A STUDY JUST COMPLETED BY KAISER ALUMINUM AND CHEMICAL CORP. emphasizes the wide open, potential use for aluminum parts in missiles, as these weapons move into mass-production stages. They seem certain to take the place of conventional artillery for tactical use by both the Air Force and surface military units. Practically every missile part from nose-cone to liquid oxygen tanks can be made of aluminum, according to the Kaiser survey. This includes support-system components and propellants. Some missiles already use the metal. Vanguard uses 3700 lbs; the Army's Redstone uses 4500 lbs; and the Air Force's Snark uses 3900 lbs.

THE WORLD'S BIGGEST POWDER-METAL PRESS dwarfs its operator at the Amplex Division of Chrysler Corporation in Detroit, Michigan. The biggest press of its kind on earth, it can exert six million pounds pressure. Towering above the plant's floor, the machine is more than three stories high. It was necessary to excavate a pit ten feet deep for its base. In order to set it in proper position, one hundred tons of concrete and steel were used to re-inforce it. To supply power, especially laid electric feeder lines run directly to the press. According to G. W. Trichel, president of Amplex, the new press can produce parts of powdered metal that are of great size. Largest of these, he states, will be as big as 30 inches in diameter.



Trichel also stated that the new press is the only production machine of its type which is now in operation.

Peak production of powdered metal pieces from the press is said to be as many as 150 of the large-sized parts for each hour of operation.

Amplex is now able to offer the widest range of metal powder products that it is possible to produce, according to its president.

At the extremes of its production range, the new press can turn out a 235 lb. Oilite bronze maintenance bearing, believed to be the heaviest powdered metal part, and tiny rivet-thrust bearings averaging 10,000 to the pound.

These are the largest – and smallest parts – produced on the press.

THERMO-ELECTRIC GENERATORS seem destined to supply much of the world's electricity in the future.

According to Dr. Eugene Wainer, vice president of Horizons Incorporated of Cleveland, Ohio, these generators have the advantage of being small and not using moving parts.

They operate on the principle that direct current is produced when certain materials are joined together and heated from the outside.

Most recent interest is due to troubles in operating steam turbines with heat from nuclear piles. Converting this heat directly to electric current with a thermo-electric generator would be much more efficient.

It would do away with the need for much of the work and facilities now needed to convert atomic energy into useable electrical energy, and do it at a low cost to the user.

for small die castings . . .

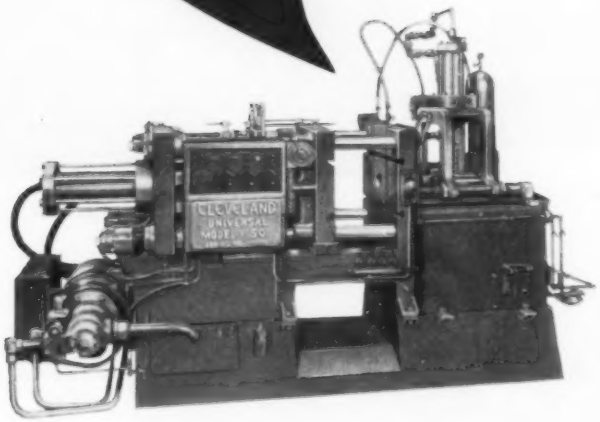
you'll get profitable production from this fast, efficient, low cost

CLEVELAND
Model 50

For small die cast parts, you can depend upon the Cleveland Model 50 Universal Hydraulic Die Casting Machine to give you *profitable* production — on high volume runs or short runs where the die investment can be low.

Very economically priced, the Cleveland Model 50 is designed and engineered to provide every essential to insure precision-quality castings at a high rate of speed. The Model 50 will free cycle at over 1000 times per hour. Tie bars, toggle links, pins, platens are of extra-heavy, rigid construction. Automatic electric timing of the cycle is a part of the standard control system. Hydraulic controls are provided for core pulls. High injection speed and pressures assure sound, dense, *"hardware"* finish castings.

Detailed information on these and many other Cleveland-quality features is given in Bulletin No. 50, which also describes the next size larger, Model 100, Cleveland Die Casting Machine. Write for your copy today. Better still, arrange now to discuss your die casting machine requirements with the Cleveland Automatic Sales Engineer in your area. There is no obligation.



Cleveland Model 50 Universal Hydraulic Die Casting Machine. Converts from zinc, tin or lead casting to aluminum, brass or magnesium casting by simply changing the hot-metal shot end. Size of die plates: 18¾" x 22". 50-tons locking pressure. Similar in construction to machine shown above is the Cleveland Model 100 Die Casting Machine which has 22½" x 24½" die plates, 100-tons locking pressure.

Write for Bulletin 50

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For more information circle No. 16 on the Reader Service Card

Why You'll Like Cromo-High V For Long Production Runs

When die-casting zinc, aluminum or magnesium, you can count on long production runs from dies made of Cromo-High V—Bethlehem's 5 pct chrome-moly tool steel, with 1 pct vanadium.

Engineered for long service, Cromo-High V has extra toughness, and resists both wash and erosion. Cromo-High V is made by a controlled melting procedure. Uniformly annealed, it's easy to machine. It also has good center density and grain refinement, and is free from porosity.

Cromo-High V is ultrasonic-tested for quality. It responds uniformly to heat-treatment. You can also count on uniform heat-treatment in massive sections to a hardness of Rockwell C45-47.

It all adds up to a top-choice steel for those long runs. Plan now to give Cromo-High V a workout. Your Bethlehem tool steel distributor has this fine grade in stock, and will be pleased to work closely with you.

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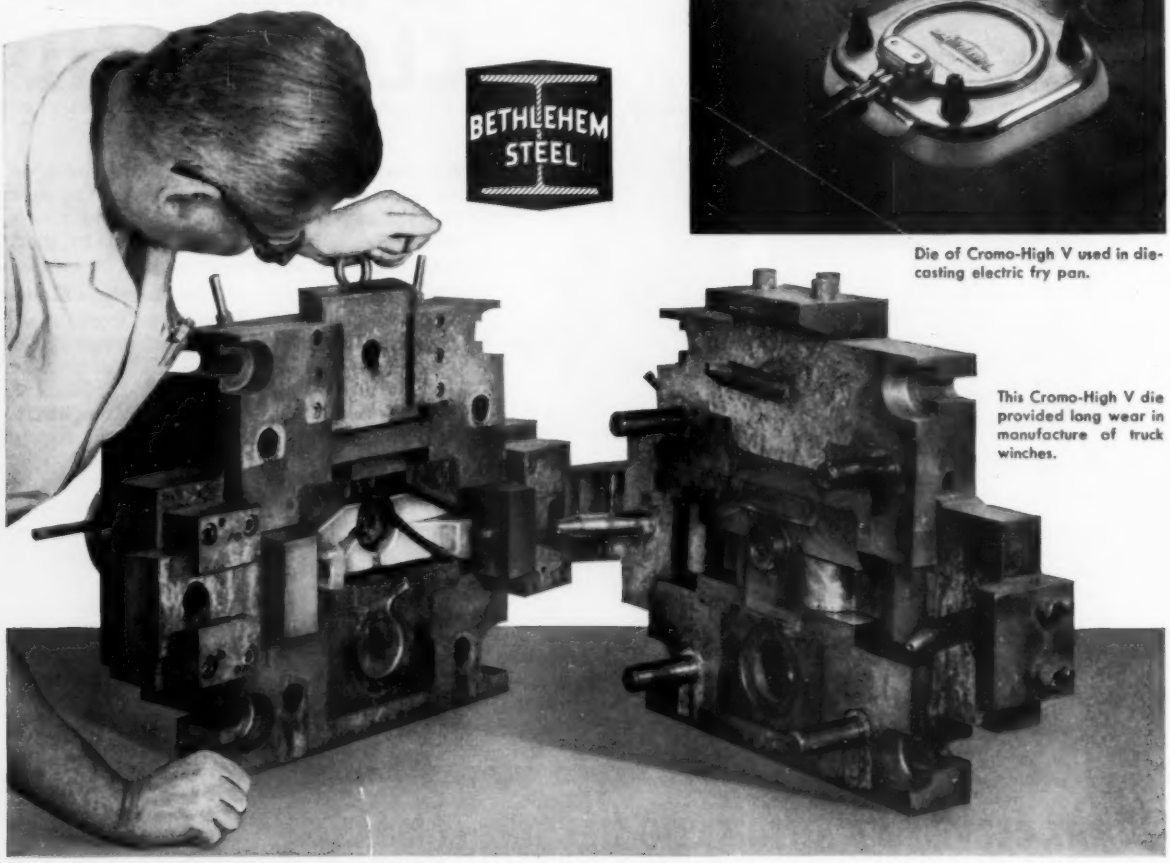
Die of Cromo-High V used in die-casting electric fry pan.

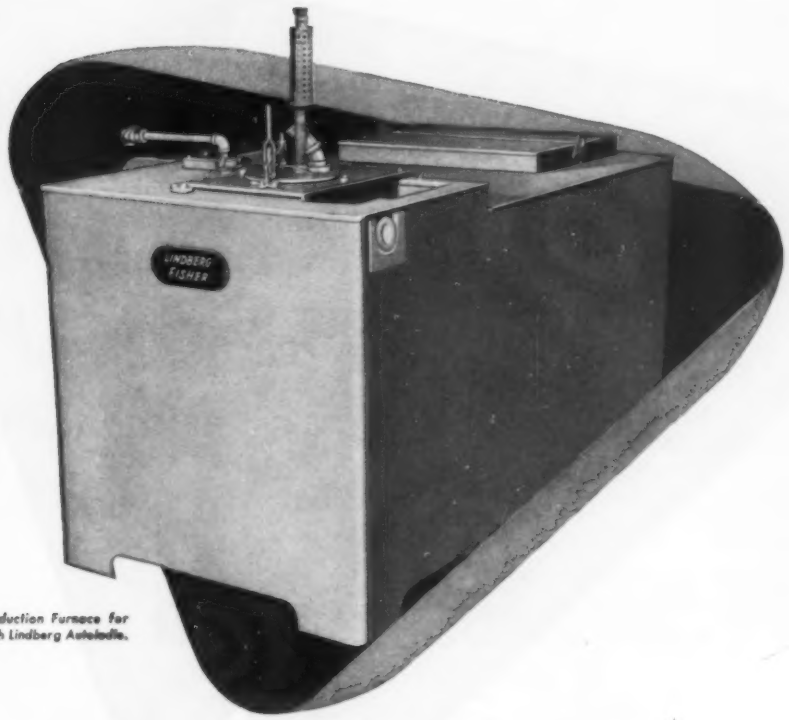


This Cromo-High V die provided long wear in manufacture of truck winches.

BETHLEHEM TOOL STEELS

For more information circle No. 12 on the Reader Service Card

Here's the ideal combination for casting aluminum automatically



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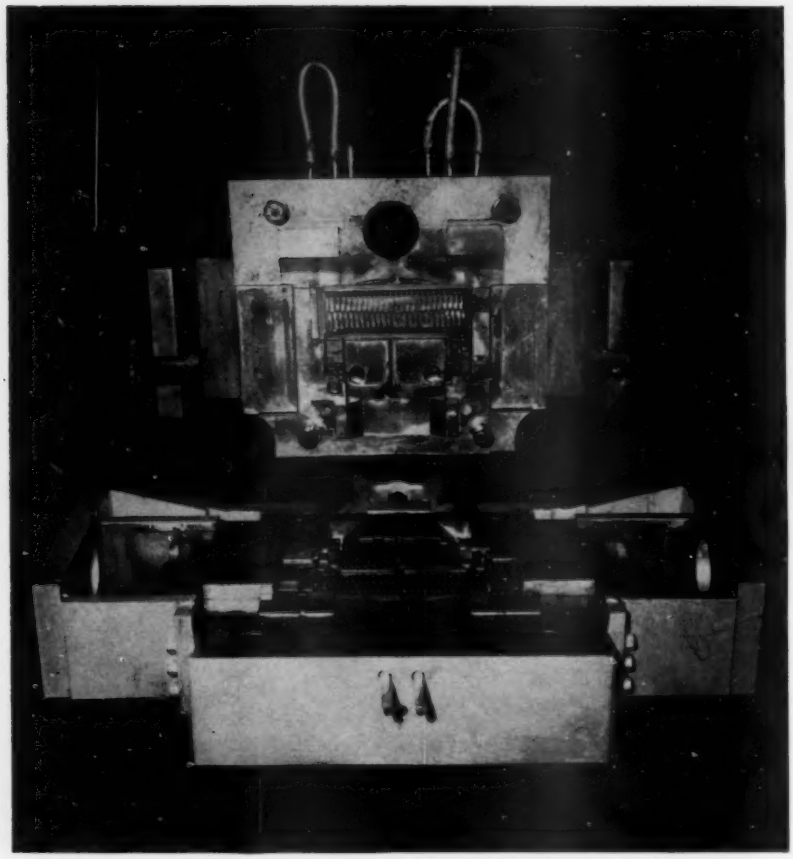
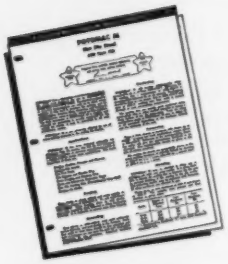
LINDBERG heat for industry

For more information circle No. 36 on the Reader Service Card



No matter what your DIE-CASTING JOB may be...

Accuracy calls for POTOMAC M Hot Work Die Steel



Write for BLUE SHEET on POTOMAC M

This concise four-page folder gives all needed handling and shop treatment details on Potomac M. Included is certified laboratory information on physical characteristics, and complete data on forging, annealing, hardening, tempering, etc. *Ask for your copy.*

ADDRESS DEPT. PM-7

In the precision casting of aluminum, POTOMAC M Hot-Work Die Steel is especially favored as the material for die-casting dies because its properties help assure accuracy of the steel itself *after* heat treatment. Die makers have found that size changes are held to a minimum. Dimensional stability is thus the *first* contribution that POTOMAC M makes to accuracy.

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Allegheny Ludlum makes a complete line of steels for hot-work tooling of various kinds—so, whether your need is the mass producing of duplicate parts or fabricating a few of them, call up or write "A-L" every time for hot-work counsel or service or both. Just tell us your requirements.

● *Allegheny Ludlum Steel Corporation, Henry W. Oliver Bldg., Pittsburgh 22, Pa.*

For nearest representative, consult Yellow Section of your telephone book.

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AL® FINE TOOL STEELS SINCE 1854

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To assure maximum safety in the operation of a specially developed hydraulic press for form-die quenching, North American Aviation uses Cellulube 220 fire-resistant synthetic fluid.

During the process, fully expanded parts, @ 1000° F, are transferred from a nearby electric furnace to the press for hot-forming aircraft parts made with high-strength alloys.

Cellulube . . . the *safe* hydraulic fluid . . . is available in six controlled viscosities. One of them is best suited to your purposes and to the safety of your plant and personnel. So, for safety's sake, investigate Cellulubes. We will be glad to supply the information you want. If you'd like to have a sample, please let us know the application involved.

Celanese® Cellulube®

Cellulube . . . a Celanese fire-resistant functional fluid

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TADANAC ZINC SHAPES THE THINGS TO COME

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How Glidden can help you produce better Metal Powder Parts...

Whether you are interested in improving the operation of an existing metal powder parts department, or desire to establish a new parts department, Glidden can help you.

Glidden not only offers the helpful assistance of its metal powders lab and trained metallurgists, but can also supply you with RESISTOX Metal Powders that permit faster production of precision parts with greatly improved finish, appearance and performance characteristics. And Glidden has the facilities to produce up to 30,000 pounds of RESISTOX Metal Powders in one batch—an important factor in complete uniformity of mass-produced parts.

Why not take a careful look at the manufacturing method you are now using. Make certain you are not overlooking the economies, speedier fabrication and superior parts performance you can get by using Glidden RESISTOX Metal Powders. Write on your letterhead for complete details.

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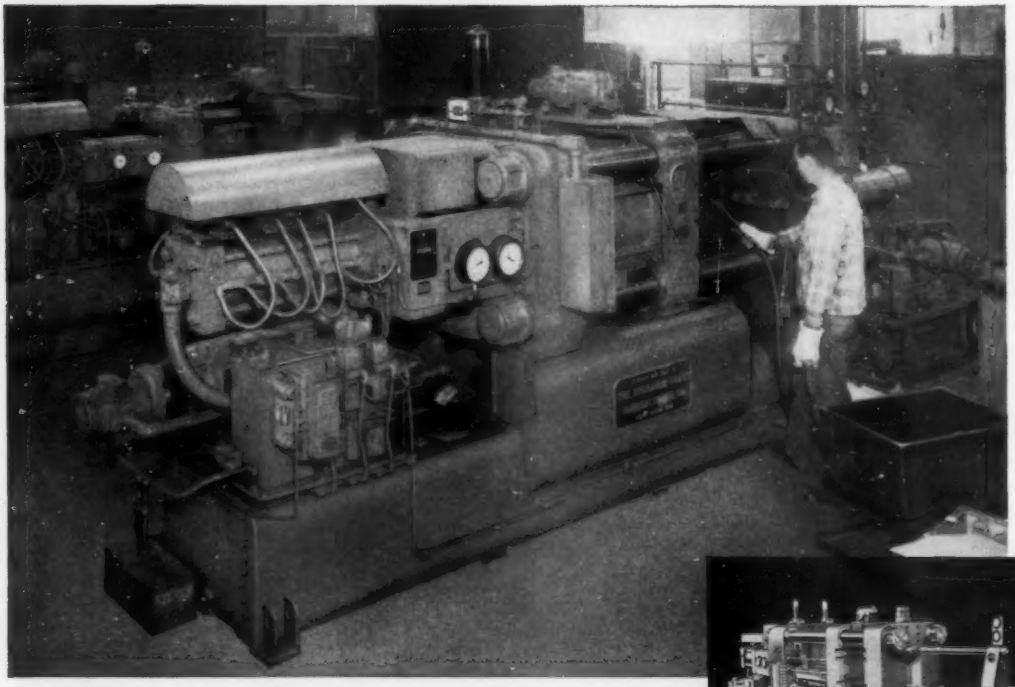
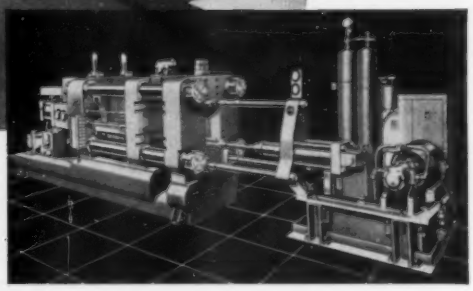
NOW MINNEAPOLIS-HONEYWELL
DIE CASTING WITH H-P-Ms





The Reason . . . Top Quality Parts are a MUST with This Company

With the installation of five H-P-M die casting machines in this company's new Golden Valley Plant, Minneapolis, the rigid requirements for die castings going into its finished products have been met. Confronted with the need for airtight and watertight castings to assure protection for their products in the field, high quality wall sections and surface finish are an absolute necessity. Yes, the new H-P-M approach in metal injection and the rigid clamp is doing the job. Then, too, the rate of production with these machines has been high and rejects have been reduced to a minimum.

H-P-M die casting machines have a lot to offer for your production, too. Investigate thoroughly the advantages of these new machines. You won't have to pass up the tough jobs. Put them on an H-P-M . . . profitably! Call in a nearby H-P-M engineer or write for Bulletin 5700, today.

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HPM

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News!

FEDERATED METALS DIVISION

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AMERICAN SMELTING AND REFINING COMPANY

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for foundry and die casting use

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For more information circle No. 34 on the Reader Service Card

LETTERS

the readers' forum

DESIGNING FOR DIE CASTING

Handbooks describing the characteristics of various materials usually include tensile strength, shear strength and other properties. Where die castings are concerned, however, such descriptions are considered only as a guide, and discretion must be used when designing a part for the proper strength. Would you forward to us any articles or publications that would serve as an additional guide for the design of aluminum die cast parts.

We would also be interested in obtaining information regarding die cast test bars and the procedure generally followed for casting and testing. – R. W. M., Mfg. Engrg.

This reader has been referred to the American Die Casting Institute for further information. The ADCI has set up minimum design standards and test bar standards for its members. – Ed.

DIE CAST GEARS

We have been referred to your magazine for assistance in locating a company that is in the small size bevel gear die casting business. The gears to be cast in a zinc base alloy. – C. O. C., Mgr.

The names of several companies who might be able to help this reader have been forwarded.

PLASTER MOLD CASTING

I would like to know some of the trade names of plaster and talc used in plaster mold making. Please send me this and any other information you have available pertaining to plaster mold casting. – J. O., owner

Information sent. – Ed.

IDEA FILE

I would like to congratulate you on the Idea File in your May, 1958 issue of PRECISION METAL MOLDING. I can imagine the tremendous amount of work that has gone into this article. It should certainly stimulate the thinking of a great many designers who are, perhaps, not as

continued on page 45

ACHESON

dispersions digest

Reporting uses for

dag® BRAND DISPERSIONS

COLLOIDAL GRAPHITE, MOLY-SULFIDE, VERMICULITE, AND OTHER SOLIDS

SUPERIOR CASTINGS, LONGER DIE LIFE ATTRIBUTED TO 'DAG' DISPERSIONS

Die casters and molders are expressing a growing preference for Acheson 'dag' brand colloidal dispersions. The consistent high quality of these products and the multiple benefits they offer have obsoleted most other mold cavity coatings. As outlined below, Acheson dispersions greatly aid in the manufacture of more uniformly sound castings having smoother surface finishes, facilitate metal flow and parting, and consequently extend the effective service lives of the dies and molds on which they are used.

Acheson 'Prodag'®, spray-applied on permanent molds at Paragon Aluminum Corporation, has given them consistently higher quality castings and fewer rejects.

Better surface finish with 'Prodag' permanent mold coating is just one of the reasons why Paragon Aluminum Corporation, a Division of Detroit Harvester Company located at Monroe, Michigan, switched to this Acheson product. After four years of experimentation with other mold washes, Paragon chose 'Prodag' — Acheson semi-colloidal graphite in water — and has used it constantly the past seven years. The reasons for its choice are these; uniform consistency, excellent heat-transfer quality, and its hard, smooth, tenacious film which resists flaking and provides easier parting characteristics.

With about 95 per cent of its annual output of more than two million pounds of castings going to the automotive industry, Paragon must insist upon quality. 'Prodag' helps to maintain this standard. These parts for convertible automobile tops are precision-molded from both 355 and 319 aluminum alloy. Molds are preheated before each day's run to 600°F and the casting cycle maintains this temperature. The 'Prodag' dilution ratio is 1 to 4 parts water and is applied to the molds with a commercial spray gun. Aside from occasional touchup at points of greatest wear, this coating lasts through the entire run. Because of the physical contours involved in these comparatively small, light castings, they require rapid cooling in certain areas to insure uniform strength. The 'Prodag' coating — with its proven fast heat transfer ability — allows the castings to cool without breaks or pinholes. And by parting more easily, the high-finish castings which result have given Paragon Aluminum products wide acceptance in this demanding industry.

Typical parts cast at Paragon Aluminum include these automobile convertible top braces. More uniform strength, better finish, and fewer rejects result from this company's use of Acheson 'Prodag'.

Colloidal graphite increases die life because of its stability at high temperatures, excellent lubricating qualities, and its ability to prevent adhesion and the scrubbing effect of hot metal. This cannot be said of conventional petroleum compounds which either decompose rapidly at temperatures above 300°F or do not possess the required lubricity necessary under good die casting procedures. It will not volatilize when in contact with the hot metal and cause pock marks due to gas formation. It will perform when present in extremely thin films which will not affect dimensions or cause discoloration of the parts being cast. And since it does not volatilize or otherwise be destroyed in the casting process, it does not need to be applied as often as other lubricants. This fact alone has often increased production as much as 25%. Investigate the use of an Acheson colloidal dispersion in solving your die casting problem . . . *It probably is the very answer you need.*

If you have a metal casting problem, call in your Acheson Service Engineer. Or if you prefer, write direct for additional information contained in our Bulletin No. 425. Address Dept. PMM-78.

'dag' and 'Prodag' are trademarks registered in the U.S. Patent Office by Acheson Industries, Inc.

ACHESON *Colloids Company*

PORT HURON, MICHIGAN

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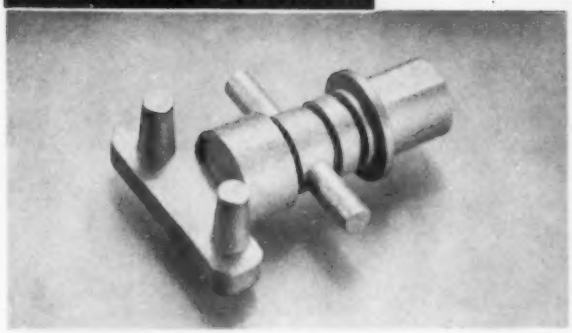
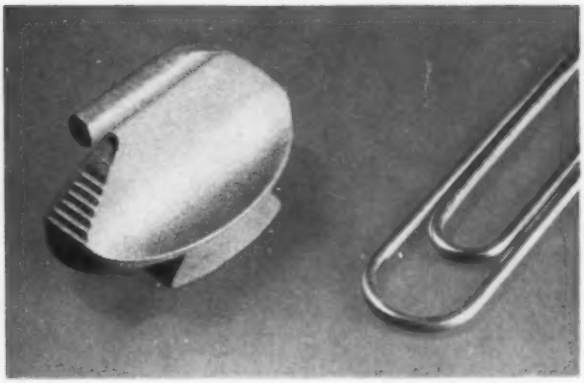
Leads the way
in vacuum die casting

NEW ENGLAND
DIE CASTING COMPANY
WEST HAVEN, CONN.

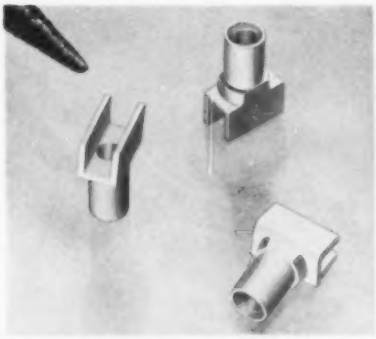
INVESTMENT CASTINGS



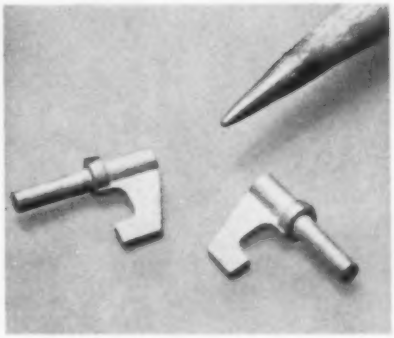
1. **A 303 STAINLESS** steel casting held to extra close tolerances.



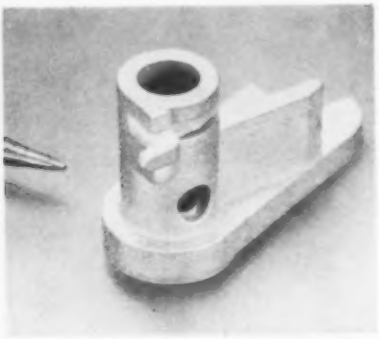
2. **REPLACING** low carbon steel, a better sight at lower cost.



3. **OPTIMUM DESIGN** and light weight, are only possible by investment casting.



4. **LESS THAN 0.2"** maximum length with 0.045 wall thickness in tool steel.



5. **ELIMINATION OF ASSEMBLY** operations gives better design, stronger part.

Save Money With Small Investment Castings

By **VINCENT S. LAZZARA***

SALES of investment castings for commercial applications will reach an all-time high of more than $19 million in 1958. Of this, the electronic and machinery, plus a large number of consumer end-use product industries will account for the greatest volume of sales.

A very high percentage of the parts that are now or soon will be investment cast were originally made by some other casting method.

There are two reasons for the conversion: First, investment casting can compete in price with any other method of manufacture; and second, investment casting permits greater freedom of design and wider choice of metal than any other process.

Many of these parts will be classed as "miniature." They will have less than one cubic inch total metal volume. This field of manufacture has always been held by the stamping, forging, screw-machine and similar industries. With techniques known today, these parts can be investment cast at lower cost.

Furthermore, the earlier methods of manufacture were so rigid that the most desirable shapes could not be made. With investment casting the parts may be redesigned to incorporate the most desired operating features. Typical examples of these miniature parts are illustrated above.

Part of a micro-switch assembly is shown in figure 1. Cast in stainless steel, the shaft diameter is held to ±0.002", saving 60%.

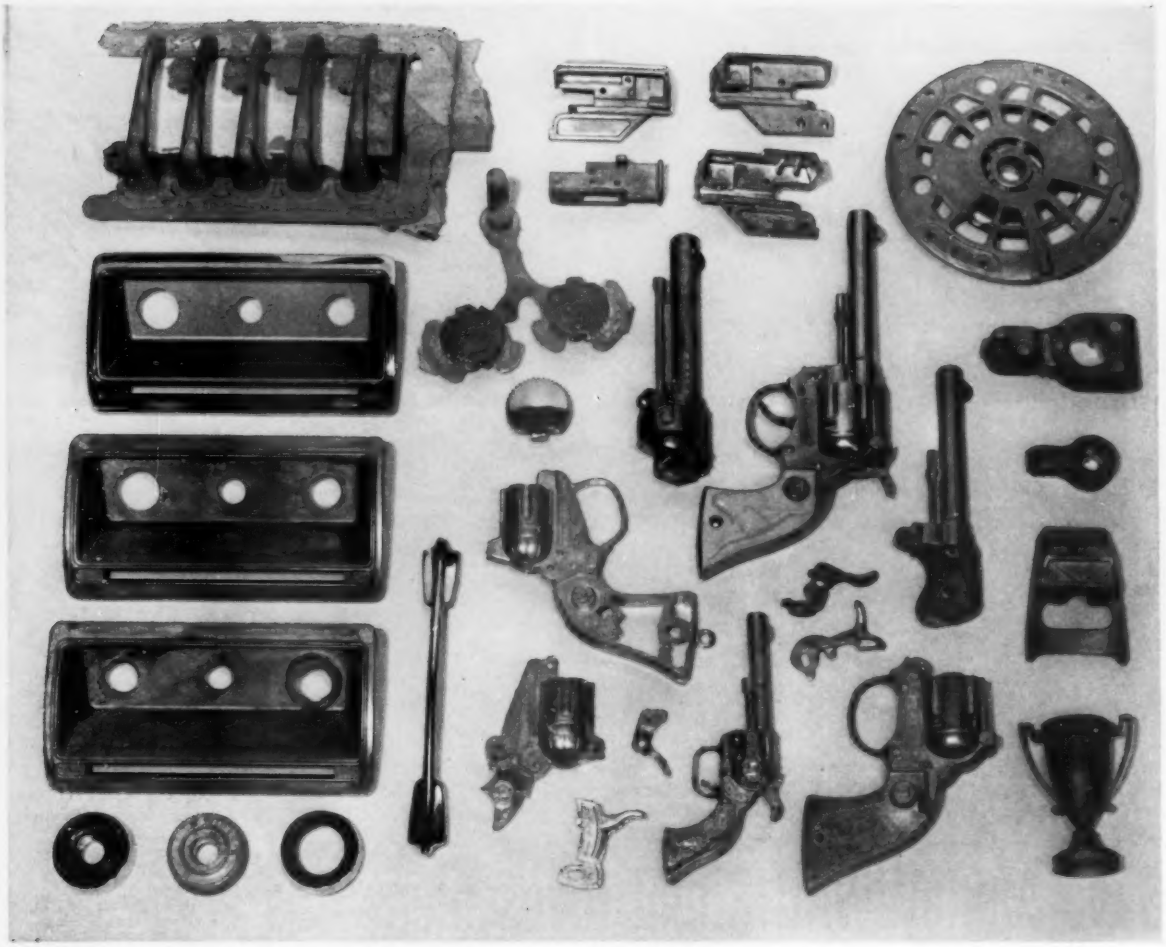
The front sight on a 22 cal. rifle. Formerly machined from bar stock, now investment cast in beryllium copper, saving 20%, figure 2.

A drive shaft for a Hi-Fi tone arm in figure 3, is investment cast in 356 aluminum. No other method of making this part was economically possible. It's one of the worlds smallest aluminum investment castings.

Part of the perforating mechanism on a teletype machine is shown in figure 4. A silicon-manganese tool steel, it was formerly stamped from low-carbon steel, machined and coined. Cost saving, 62% and critical dimensions are held to 0.002" tolerances.

The casting in figure 5 is for the coin changing mechanism on a vending machine. Investment cast in 303 stainless it was formerly fabricated by brazing a series of stampings. A stronger, better designed part at no increase in cost.

*President, Casting Engineers, Inc., Chicago, Illinois



CAST DIES were used to make these aluminum and zinc parts.

Cast Die Cavities . . . Part 1

By IRWIN LUBALIN*

THE readers of PRECISION METAL MOLDING who have seen previous articles on the Shaw Process[1] will appreciate the fact that this process has considerable scope other than in the casting of tools and dies. Its primary function was in the making of large precision castings mainly for the aircraft, missile, and nuclear energy fields, of a size beyond the capacity of conventional precision casting techniques and practices.

However, since this precision casting process eliminates the intermediate step of making a wax die and producing waxes it is quite economical for making one casting. This might turn out to be ideal for the rapid production of die casting die cavities provided that accuracy, surface finish, and die life requirements of the industry would be met.

Although any castable tool steel or other steel alloy can be cast in Shaw molds, initial research was commenced on the 5% chromium 1% vanadium hot work die steels which are so popular in the field. It was sufficient pioneering to sell die casters on using cast cavities without trying to sell them on a different steel analysis.

The first question which occurs in evaluating this method of producing die cavities is, "Why haven't die casting cavities been successfully cast by other processes"?

Let us take a rundown on conventional casting methods to observe the reasons why it remained for the Shaw Process to be practically feasible to produce this type of casting for the first time.

1. *Sand Casting* — Since the sand casting of steel produces an extremely rough finish and only approximates dimensions, it is necessary to have a machining allowance of at least ⅜". When this is done, the skin is completely machined away and the resultant coarse dendritic structure of the sand casting gives a short die life. Also, sand

*General Manager,
Shaw Process Development Corp.
(1) See PMM Technical Reference File Aug. 1957 Page 42 "Steels for Die Casting Dies."

TOOL STEEL DIES cast to final size and contour, need only polishing.

inclusions are often found in critical areas after some machining has been done. Of course the economics of machining all dimensions are such that little is gained in cavity manufacturing cost.

2. *Shell Molding* – Again the finish produced in a tool steel casting in shell molding is unsatisfactory and must be completely machined to be usable in a tool. Here again, there is an inclusion problem caused by the washing of sand in the runner system. Desired accuracy, especially on heavy section bulky castings, is difficult to hold in a shell because of distortion under the hydrostatic pressure. The fast chilling action of the shell makes it almost impossible to cast sharp fine detail.

3. *Lost Wax* – The conventional lost wax technique would seem capable of producing tool steel castings having the surface finish and tolerance required.

However, this is uneconomical because: It is generally necessary to machine an extremely accurate die into which wax is injected. The wax is invested in refractory slurries. It is then melted out of the mold and steel is cast into it. Quite often the wax injection die is as expensive or more expensive than the tool which we are to cast.

The lost wax process is confined to relatively thin walled casting; any massive or chunky casting such as a die cavity or core would involve a massive piece of wax.

Since the coefficient of expansion of the wax is considerably higher than that of the refractory mold material, the wax expands during de-waxing to such a degree as to crack the mold causing gross dimensional variations. The lost wax molds are about 1800° F when the metal is poured; surface grain is rather large and coarse, and does not give die life comparable to that of machined forged dies.

HOW DOES THE SHAW PROCESS ELIMINATE THESE PROBLEMS?

1. *Solid Pattern* – By using a solid pattern with no intermediate expendable wax pattern all economic problems of making a wax injection die, of wax expansion, and distortion are eliminated.

2. *Microcrazing* – The Shaw molds are produced with a fine network of micro-cracks or crazing. This allows steel, at 3000° F, to be poured into the ceramic molds at room temperature with no thermal shock effect. What occurs is that each particle of refractory in the mold must of necessity expand and slightly closes up the cracks between itself and its neighbor.

This effect also accounts for the

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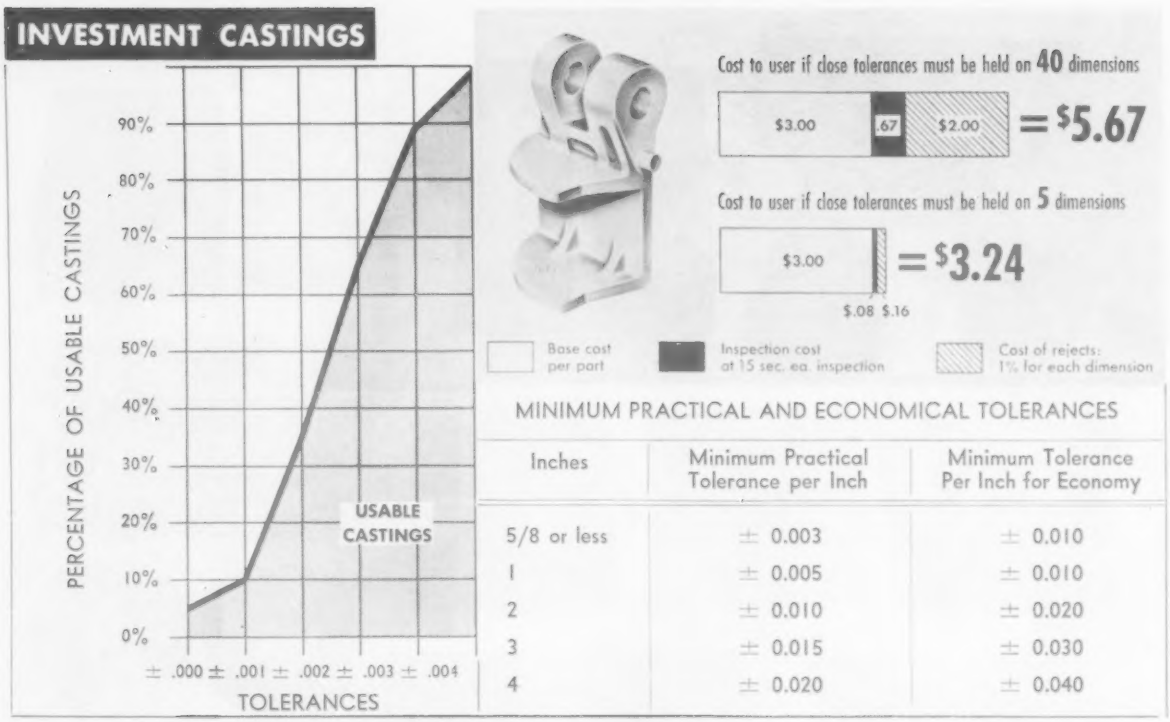


MINIMUM PRACTICAL AND ECONOMICAL TOLERANCES

Inches	Minimum Practical Tolerance per Inch	Minimum Tolerance Per Inch for Economy
5/8 or less	± 0.003	± 0.010
1	± 0.005	± 0.010
2	± 0.010	± 0.020
3	± 0.015	± 0.030
4	± 0.020	± 0.040

Are You Buying Tolerances

by WILLIAM O. SWEENY*

THEORETICALLY, it's possible to investment cast a perfect part, not a thousandth off on any dimension. But the designer who demands such a part will necessarily pay for the perfection he receives.

If he really needs it, such an expense could be justified. Yet probably the greatest misuse of the investment casting process is committed by designers who ask for – and pay for – close tolerances on dimensions where they are not actually needed.

Basically, there are three reasons behind this tendency to ask for cream when milk will do:

1. The average designer is accustomed to processes such as machining where close tolerances are common.
2. Specifying close tolerances is standard practice in his drafting room.
3. Investment casting as an industrial process is relatively new, and its limitations as well as its advantages are not fully understood. Add to that the fact that in the early days of the industry, the capabilities of investment casting were frequently oversold, and it becomes easy to understand why it is often not used to its most economical advantage.

ADVANTAGES AND LIMITATIONS

Under certain conditions, investment casting can produce parts more economically than any other method, especially when the quantity needed is in the range of a few hundred to a few thousand pieces. Frequently it permits designers to use an alloy which is far preferable for their purposes, but which could not economically be machined or forged. And, of course, there are some shapes which can only be made by investment casting.

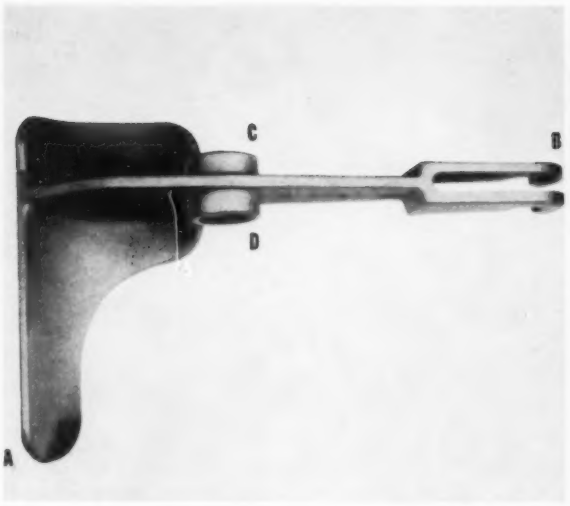
Used properly, investment casting can open up new freedom of design and new areas of economy. But to take full advantage of it, a designer must be aware of two important facts:

1. The closest *practical* tolerance which can be met in an investment casting is ±0.005"/inch.
2. The minimum *economical* tolerance is ± 0.010"/inch.

Investment casting foundries do not specify these tolerances simply to make life easy for themselves. Rather, they are set by a number of variables inherent in the process.

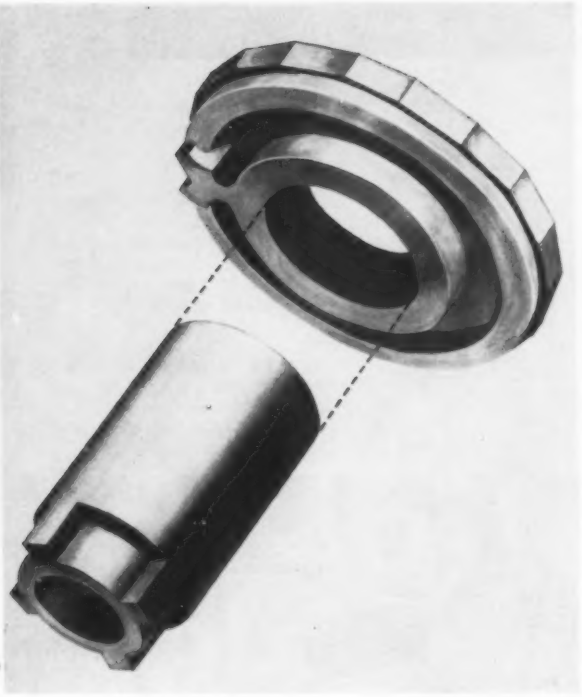
For instance, there are shrinkages in the expandable patterns, in the investment mold, and in the cast metal after it is poured. All of these variables alter with the slightest change in pouring temperature, position of the flask in the oven,

*Vice President, Arwood Precision Casting Corporation



A CRITICAL DIMENSION—the position of hole C-D. Most economically produced in an investment cast part by drilling.

FITS might be for interference, snug or loose. Increase OD and decrease ID for the most open possible fit.



You Don't Actually Need?

and other factors.

While it is true that they can be controlled to a very great extent, perfect control over all of them is not possible, and each variation eats up a little bit of tolerance.

It is obvious, therefore, that when a designer specifies tolerances closer than he actually needs, he is going to have to pay for them.

TOLERANCE VS. COST

There are six basic reasons why the price of an investment casting goes up when close tolerances on all dimensions must be held:

1. More accurate and painstaking tooling is necessary in making the die, and the possibility of die reworking is greatly increased.
2. Need more inspections.
3. There is a higher reject rate.
4. The number of pieces which can be put in a flask is reduced.
5. Gate removal is more expensive.
6. On long thin parts, or parts subject to warping and distortion, straightening and sizing is costlier.

Let's look at these one by one, and see how they affect the cost of the part.

TOOLING

The first is self-evident, for it takes time to build accuracy into a die, and in investment casting as in any process time costs money.

INSPECTION & REJECTS

The next two should be taken together as there is a definite relationship between inspection and reject rate.

At this point let us assume a hypothetical part in which we are asked to inspect and hold close tolerances on 40 dimensions, whereas in actual usage only five of these dimensions are critical and actually require precision casting. This example is not too far-fetched, for we have had close dimensions specified on surfaces which we later found were simply hanging in air, with absolutely no necessity for the accuracy we had to cast in.

Now assume that the part we are citing costs $3.00 for everything but the dimensional inspection and the cost of rejects. First of all, each separate inspection adds to the price of the part. If we have to make 40 inspections at 15 seconds each, we spend 10 minutes inspecting each part, and the price per part has to rise by about 67 cents.

Even this, however, is not the biggest factor. Consider the rate of rejects. If we reject only one out of a hundred on each of the 40 dimensional checks, we still have an initial reject rate of 40%. Since the same reject rate would apply as we cast parts to replace those rejected, the final price addition on reject

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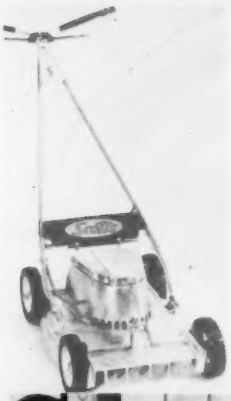
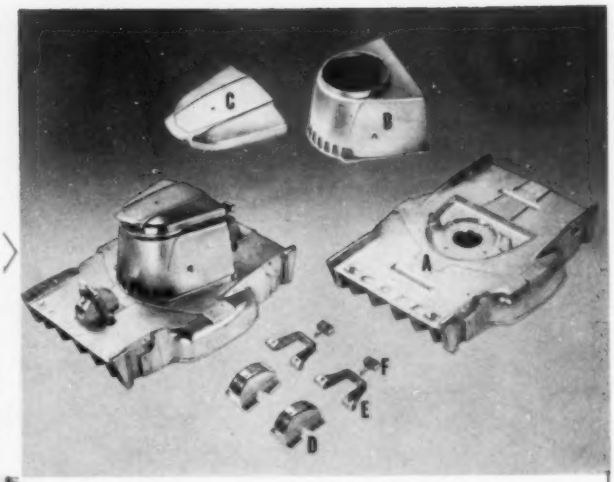
PERMANENT MOLD CASTINGS



1. MOWER, finished and ready to go to work.

2. EXPLODED view: permanent mold castings: A—Housing; B—Hood; C—Cap; D—Two Elevation Indexes; E—Two Elevation Set Screws.



3. CLAY MOCKUP is studied by G. E. Schmid, chief engineer at Monarch, and his crew who will work on the Scott lawnmower castings.

TYPICAL AS-CAST MECHANICAL PROPERTIES

Alloy	Ultimate Strength PSI	Yield Strength .2% set PSI	Elongation % in 2"	Yield in Compression PSI	BHN	Shear Strength PSI	Endurance Limit PSI
12	24,000	15,000	1.5	16,000	70	20,000	9,000
43	23,000	9,000	10	9,000	45	16,000	8,000 (1)
319	34,000	19,000	2.5	19,000	85	24,000	10,000 (1)
356-T6	40,000	27,000	5	27,000	90	32,000	13,000

(1) Endurance limit as sand cast.

Use your foundryman's knowledge in . . .

Planning, Designing,

STEEL and iron castings were too heavy; glass-fiber, reinforced plastic was too weak; and stampings were out because of design limitations and unfavorable strength to weight ratio. O. M. Scott & Sons Co. – the lawn people – turned to aluminum castings to help them produce a rotary, electric lawn mower that would meet the rigid specifications they had set up.

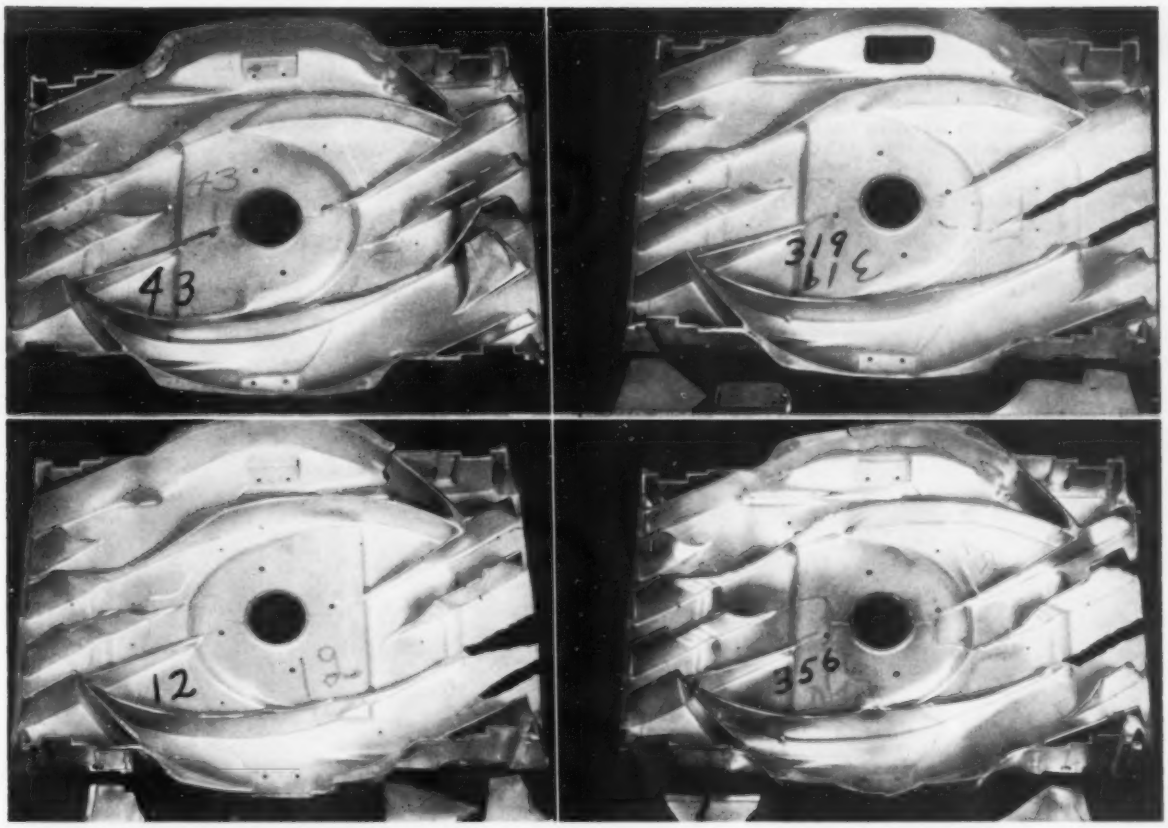
Now simply building another rotary lawn mower with an electric motor instead of a gasoline engine as the drive unit would gain little – there are too many on the market now. The real problem was to design a mower that would lift the grass evenly, cut it uniformly and then distribute the mulched cuttings in a uniform manner over the lawn surface. Clumps and windrows of cuttings would not be tolerated.

These features required careful study of air flow, from the ground up. Grass cuttings are nearly always damp; they have a strong tendency to stick to the underside of the mower housing. Here again, design from an air flow principle had to be studied. Air velocities had to be great enough to keep the grass clippings moving until they were finally expelled onto the lawn – uniformly.

Still another problem came up to plague the designers. There is always debris on a lawn. Some of it, such as sticks and stones would be picked up by the mower and hurled against the housing. The housing had to stand this impact. Also, the debris must be expelled from the mower in such a manner that neither the operator or persons standing near-by would be struck and injured.

All of these problems could be solved and the engineers at Scott did the job. They developed the proper aerodynamic flow to meet all of their requirements. But, and here was the big question, could aluminum castings be made with the required contours, with sufficient strength and resistance to impact, with a good external appearance without surface finishing, and at the same time low enough in cost so the finished mower would be competitive.

From the start, sand castings were out. Neither the design or the desired finish could be secured. Also, sand castings required too much finish machining to be economically used.



4. FRONT AND BACK views of the permanent mold housings after impact tests. Each of the housings is cast in a different aluminum alloy. After all tests were completed, the conclusion was that only one was strong enough to survive, alloy no. 43.

and Producing Castings

Finally the Scott engineers made a clay mock-up (figure 3) and took it to Monarch Aluminum Mfg. Co. They wanted to know if the parts could be made as either die or permanent mold castings. Since Monarch has both facilities, they could give a completely unbiased opinion. With minor design variations, either casting process could be used. Original tooling was considerably more expensive for die castings, but piece costs might be a bit less. The clinching argument in favor of permanent mold casting was the surface finish. A smooth finish such as secured from die casting did not carry the suggestion of ruggedness that was wanted.

There were seven castings involved (though only five different ones, figure 2). Four of them, the two elevation indexes and the two elevation screws presented no problem. The housing, the hood and the cap were a different story.

The housing is big — 20″ x 25″ and about 3″ deep and weighs 17 pounds. To keep the weight as low as possible, wall thickness had to be held down and the fins on the underside were critical if air flow was right. Also the designers had pretty definite ideas of dimensional tolerances.

Starting with the clay mock-up Monarch engineers went to work on redesign. They had the added problem of castability. The final housing design that suited everybody, had walls only 0.15″ thick and the air flow fins were 0.188″ thick with a 3° taper for mold draft. Further, dimensional tolerances were held to ±0.010 for the first six inches and 0.002 per inch above six inches. This was a compromise that everyone could live with.

Both the hood and the cap had to match in appearance and again had to be as light as possible. The final design was for castings only 0.110″ thick.

Monarch engineers and metallurgists chose 43 alloy as the best because of its high strength, good ductility, resistance to all sorts of corrosion and good casting qualities. But Scott engineers were not sure it was the best. Duplicate test castings were made in these alloys: 43, 319, 356 and 12. All test castings were then given these impact tests:

. . Drop each casting from a height of 20 ft. onto a concrete floor.

. . Put each housing on the

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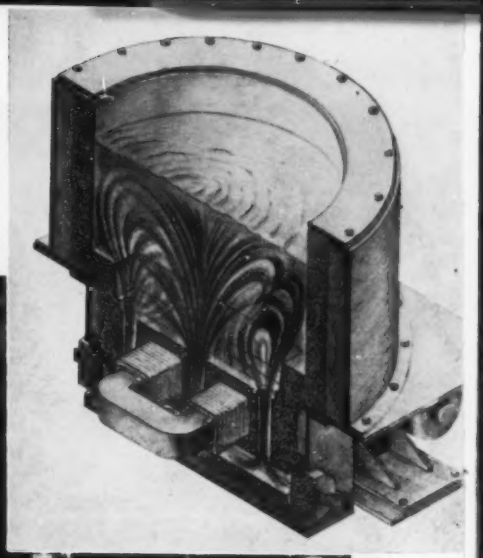
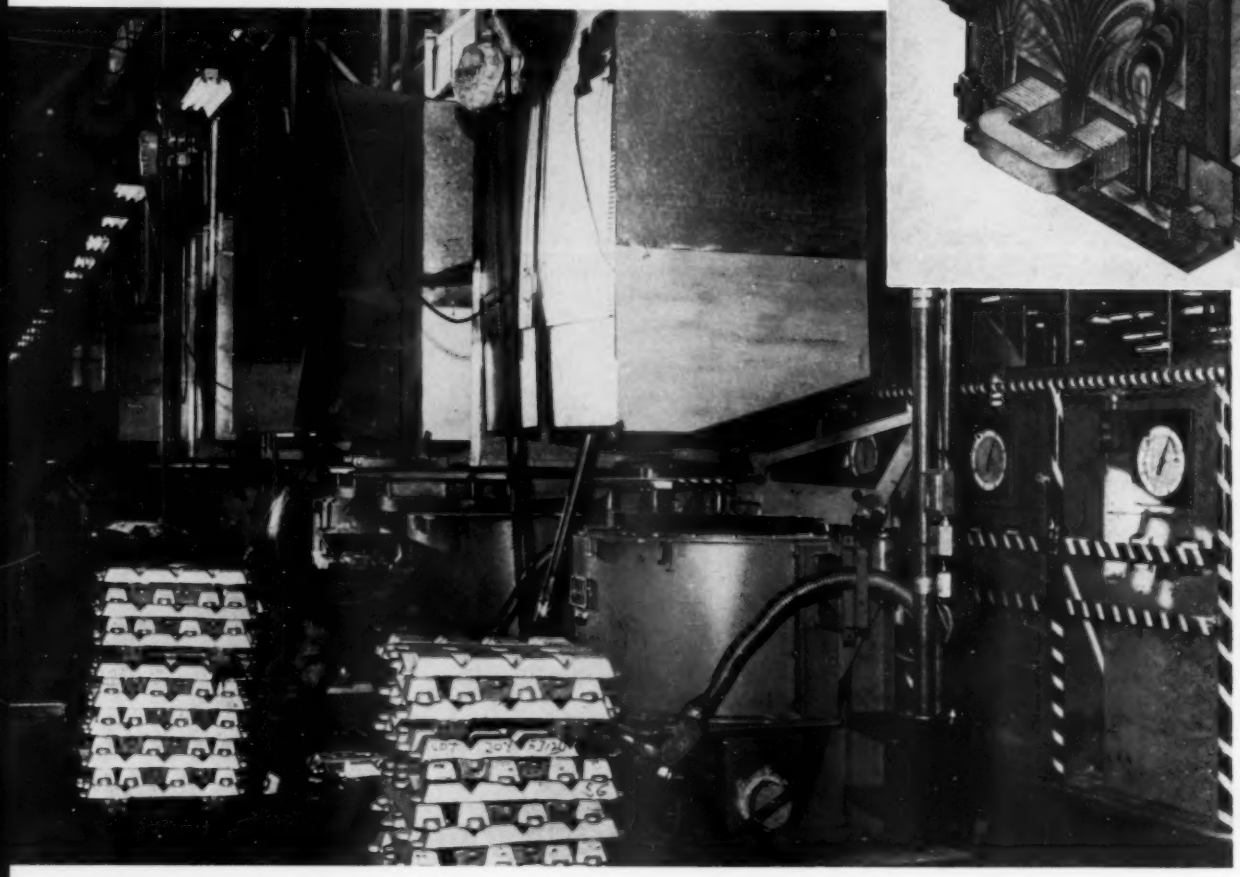


CROSS SECTION of 60 cycle induction melting furnace. Metal has constant circulation due to electromagnetic forces.

GROUP OF INDUCTION MELTING FURNACES and their control panels. These panels can be clearly seen at the far right of the photograph.



Electric Melting and Holding of Aluminum

BY HERBERT CHASE

BRIGGS & Stratton Corporation's newest plant in Milwaukee, Wis., is devoted to the exclusive production of small gasoline engines. Aluminum alloy was the logical choice for a great number of component parts. Large volume manufacture considerations dictated the use of die castings for greatest economy, since die castings provide uniformity and the possibility to cast close to finished sizes with a minimum of machining. In general, sections can be made as thin as adequate strength and stiffness permit, hence high economy in metal utilization is attained.

One of the major requirements in die casting is that the metal entering the die be clean and at the proper casting temperature. The temperature varies with the size and shape of the casting. This plant has found the use of 60 cycle induction furnaces for both melting and holding aluminum the ideal arrangement to obtain these conditions and maintain the highest economy.

The melting channels below the furnace hearth, when filled with molten metal, and when current is applied, form the secondary of a transformer. Thus, heat is applied directly within the metal. Electromagnetic forces in the molten metal provide constant circulation of the melt, keep it at temperature and maintain alloy composition throughout the entire bath. The furnaces are refractory lined, providing a furnace hearth which is essentially inert to the attack of molten aluminum.

Furnaces are operated on a con-

tinuous basis, as stoppages would be detrimental to lining life and might damage other furnace parts. In present practice, the life of the refractory lined furnaces has been generally between six months and more than one year; however, the majority of the furnaces have their original linings and no life limit has been established. Some impurities tend to accumulate in the vertical channels below the furnace hearth but these are easily cleaned with special tools, based on a routine schedule. As a rule, melting furnace channels are cleaned once every hour, holding furnaces every eight hours.

MELTING FURNACES.

Briggs & Stratton Corporation now uses a battery of 14 induction melting furnaces for the melting of aluminum alloys for die casting. These units have a power rating of 100 kw each and an hourly melting rate of 500 lbs. Each has a capacity of 1200 lbs. Together, they melt over 100,000 lbs. per 24-hour day.

Liquid metal temperature of this group of furnaces is controlled by indicating-controlling pyrometers.

Temperatures are usually held at 1300°F ± 5°F.

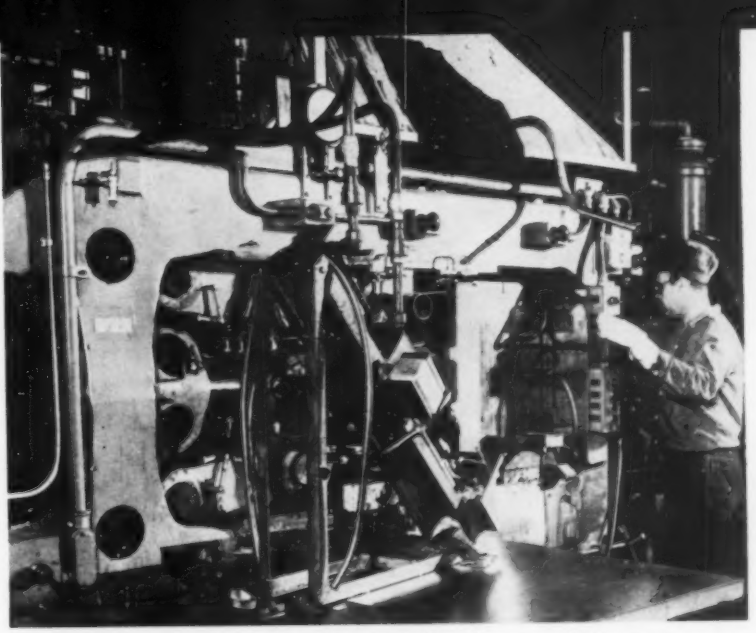
Ingot is delivered to the furnaces by fork truck. Special steel containers collect gates, sprues, and other return metal from the plant. Particular attention is paid to keeping the various alloys separated in clearly marked containers which are periodically returned to the corresponding melting furnaces. Charging of the furnaces with this material is by chain hoist.

One induction furnace is separated from the other units and melts piston alloy only. Particular care is given to keep this alloy separated from the others, and to a clear identification of "return metal" from the plant of this alloy.

As there are no combustion products, the furnaces themselves do not produce any smoke or fumes. The hoods are provided to exhaust smoke created when melting "return metal" which has come into contact with oil and dirt during fabricating in the plant.

A minimum of fluxing is required in these furnaces as the principle of melting produces inherently cleaner metal than any other method. In particular, there is no contamination from combustion products, nor is there a possibility of iron pickup from furnace walls. As a rule, about a handful of flux, just enough to cover the metal surface, is used for each melt. This flux combines with a small amount of dross and is skimmed off before pouring into the holding furnaces.

All melting furnaces are of the nose-tilting type and tilting is by chain hoist. Metal is discharged directly into a bull ladle mounted on a fork lift truck adapted to that purpose. This bull ladle is refractory lined and capable of holding metal temperature for a limited amount of time. An insulated lid further protects the metal during transfer to holding furnaces.



DIE CASTING MACHINE with induction holding furnace and trim press.

CHARGING induction holding furnace from bull-ladle. The large casting machine is in foreground.

ZINC MELTING furnace in a tilted position, discharging into a bull-ladle. Note raised base.

HOLDING FURNACES.

Molten metal is transferred by lift truck to the holding furnaces. The bull ladle is tilted by hand wheel and a sufficient amount of metal discharged into each furnace.

The induction holding furnaces are located directly adjacent to the Lester-Phoenix casting machines.

The furnaces operate on the same principle as the melting units. They have a power rating of 20 kw and are not used for melting but only for maintaining the molten metal

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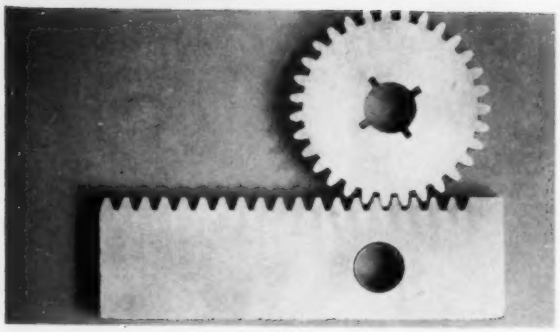
SINTERINGS



RACK & PINION are used on a power mower as parts of an all-important heighth-adjustment mechanism. Made of sintered iron, the parts are original designs and were never made by any other process. They are produced at less cost, and at a faster rate as sinterings. This means a material savings.

USE OF SINTERINGS MEANS:

- Tolerances maintained are close.
- Costs are 15% below machinery parts
- Tapping hole is only extra operation needed
- Tooling charges were extremely low
- High production rate is met
- Immediate delivery is possible
- Material and work are high quality

When You Can - Design for Sinterings

DESIGNERS know that the use of stock items is generally the most economical. But when parts must be "made for the job" — take a long look at methods before the design is frozen.

Machining from wrought stock may be the most economical. But when even moderately large quantities are involved machining seldom pays. The rack and pinion illustrated are a good example. These parts are on the elevating mechanism of the Scott electric lawn mower. They're simple, easy to machine, can be produced rapidly – there would seem to be no problem. What's more, in normal service they take a terrific beating.

Every time the wheels of the mower hit a bump or a hole in the lawn the shock is transmitted directly the teeth of both the rack and pinion. The resultant loading is mostly in shear. From time to time dirt, grass and other debris will collect in the mechanism and jam it. The operator is certain to heave a lot before he cleans.

And to make matters even worse, it's a safe bet that the entire mechanism will seldom, if ever, be oiled after it leaves the factory. But in spite of all these hazards to good mechanical operation, the mower is guaranteed for five years and this has to cover the elevating mechanism too.

So engineers and production men at Scott took that long look and came up with – sinterings; the best and the most economical parts for the intended service. Let's see how this decision was made.

QUANTITIES

Market studies indicated that the mower would be produced in large numbers. To hold costs down meant that every possible labor-saving method had to be used that would be commensurate with quality.

PRECISION

Because of the probability of chatter due to uneven lawn surteeth at all times, the surface finhad to be very good to prevent peening and early failure. Also for high speed assembly methods there had to be complete interchangeability of parts. Matching pairs could not be used.

FINISH

To insure close meshing of the teeth at all times, the surface finish had to be good. Furthermore, the lawn mower is a quality tool and all parts must reflect that quality.

TOOLING

Because of the large number of parts involved, the cost of a keeping gear cutter or milling machine permanently tied up was very high.

DELIVERIES

Parts had to flow into the assembly line on time and in sufficent numbers so that assembly would never be interrupted.

STRENGTH

Minimum strength standards were set up that immediately eliminated sand cast parts or any nonferrous parts.

FINAL PIECE COSTS

To hold manufacturing costs of the completed mower as low as possible, the rack and pinion had to be made as inexpensively as possible – always commensurate with quality.

SOLUTION

First, the Scott engineers consulted International Powder Metallurgy Co. They found that this company could produce the rack and pinion in an iron powder composition that would give them all the strength required.

Tolerances on critical dimensions that the fabricator could easily meet were adequate for the service. Finish of the sinterings would be as good as wanted. Tooling turned out to be very inexpensive, actually less than tooling up for machining.

Deliveries became no problem because of the high speed of production by powder metallurgical methods. Lubrication ceased to matter since the parts could be oil-impregnated and thus lubricated for life. Finally, the all important cost figures. They were between 10% and 15% below the most conservative estimates for machined parts.

As the parts are delivered only, one simple tapping operation has to be done on the rack, otherwise the parts are complete and ready for assembly.

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- ☐ Plaster Mold Castings
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- ☐ None of these

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14	31	48	65	82	99	116	133	150	167	184	201	218	235	252	269	286	303
15	32	49	66	83	100	117	134	151	168	185	202	219	236	253	270	287	304
16	33	50	67	84	101	118	135	152	169	186	203	220	237	254	271	288	305
17	34	51	68	85	102	119	136	153	170	187	204	221	238	255	272	289	306

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3	20	37	54	71	88	105	122	139	156	173	190	207	224	241	258	275	292
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16	33	50	67	84	101	118	135	152	169	186	203	220	237	254	271	288	305
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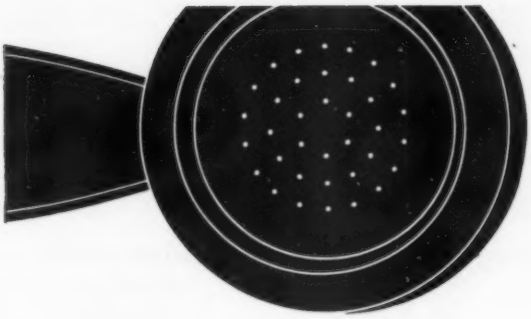

STAMPING,
6 OPERATIONS:

1. Blanked and pierced
2. Formed
3. Drilled
4. Reamed
5. Drilled again
6. Tapped

ZINC DIE CASTING

Cuts Costs 63%

ZINC DIE CASTING,
3 OPERATIONS:

1. Casting is made
2. It is drilled
3. Holes are tapped

• The parts shown here are dial bridges used in telephones made by Stromberg-Carlson at Rochester, New York. Originally made as brass stampings, production and assembly required 6 operations. Redesigning the dial bridges for die casting in zinc reduced the number of operations in half. The switch to zinc base die castings cut production and assembly costs 63%. In fact, cost figures indicated that the savings on the first 24,000 components would pay for the needed retooling necessary to convert to die casting. Comparable savings have been achieved by utilizing the die casting process for other methods of manufacture.

• This case history again proves that zinc plus die casting is one of the fastest and most practical low-cost production tools available to the country's metal-working industries.

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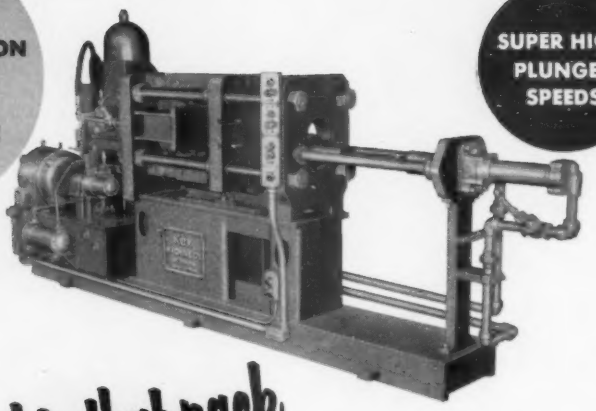

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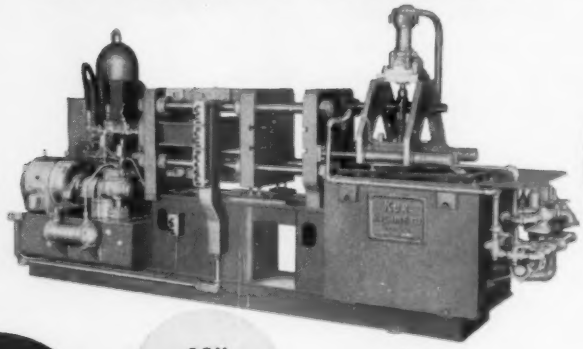
MAXIMUM
OPERATING SPEED
WITH OVER 1000
FREE CYCLES
PER HOUR



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Models HP-12 and BH-12 have 100 tons die locking pressure and 12¼" x 15¼" clearance between bars.

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Builders of a full range of die casting machines . . . from 25 tons to 1000 tons in size.

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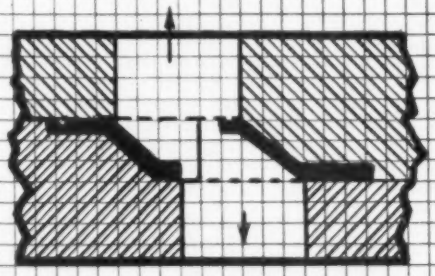
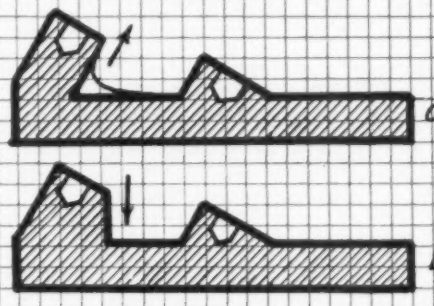
Design Tips

for lower costs
-better products

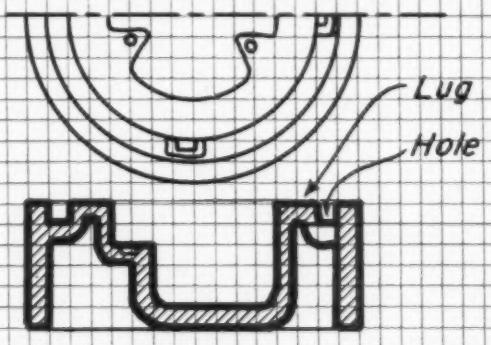
Small design changes permit straight core pulls with lower tooling costs. Avoid extra slides and irregular parting lines when possible.



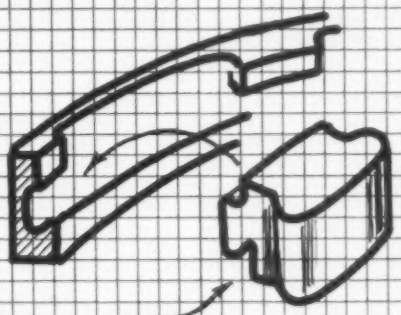
Form a skewed hole with two fixed cores. If essential some curvature can be included.

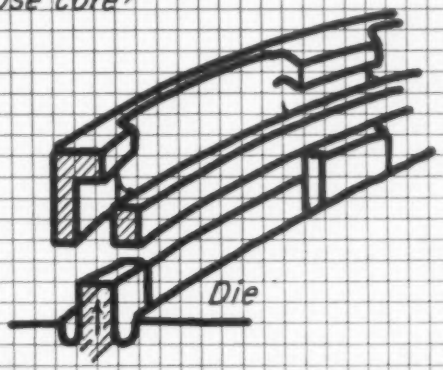


Sloping bosses (a) require extra slide inclined to the parting line. some functional design (b) uses straight die parting.

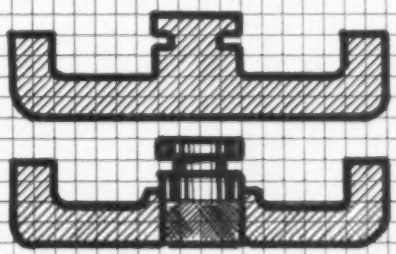


A hole under each lug allows a fixed core to form the bottom of the lug.





Minor design changes may eliminate loose core pieces, cut tooling costs, and not impair functioning.



An insert can replace an undercut in the casting; may save expensive tooling or secondary machining.

Sketches from "Designing for Alcoa Die Castings."

DATA OFFERED IN THIS MONTH'S ADS

the Reader Service Cards on the facing page will get you these free reference materials. Circle the numbers and mail.

2. Melting Furnaces—Technical information is available on the 60 cycle induction melting furnaces of the Ajax Engineering Corp. Ranging in size from 20 kw to 2000 kw, the furnaces will produce from 150 pounds per hour up to 40 tons per hour.

3. Die Steel—Data on Potomac M hot-work die steel is furnished in a concise four-page folder from Allegheny Ludlum Steel Co. Includes certified laboratory information on physical characteristics.

4. Dies & Related Tooling—Complete facilities list and detailed information is available on dies, hydrotels, pantographs, rotary head mills and jig mills produced by Alliance Special Products Division, Inc.

14. Small Die Casting Machines—A brochure from Cast-Master, Inc. gives details and specifications on two die casting machines, the 7Z for zinc, tin and lead, and the 7A for aluminum, magnesium and brass.

16. Hydraulic Die Casting Machine — which converts from zinc, tin or lead casting to aluminum, brass or magnesium casting by changing the hot-metal shot end is described in Bulletin 50. The machine will free cycle at over 1000 times per hour. The Cleveland Automatic Machine Company.

18. Dial Thermometers — which can be screwed into equipment or floated on liquids are described in bulletin No. 5, W. C. Dillon & Co., Inc. Gives complete engineering data and price information.

19. Alloy Steel Goosenecks — Dodge Steel Co. offers details on custom-made goosenecks for die casting machines which are said to last 4 to 5 years longer than iron or alloy iron goosenecks.

23. Die Casting Compounds—and other specialty lubricants and coolants are described in Bulletins offered by Fiske Brothers Refining Co.

24. Metal Powders — RESISTOX powders are produced in batches of up to 30,000 pounds, give improved finish, appearance and performance in sinterings. Complete details are available from The Glidden Co.

25. Fastener Catalog—describes molded nylon machine screws, set screws, screw insulators and bushings, washers; also die cast zinc alloy screws and nuts in a variety of configurations. All available types, sizes, and lengths are listed. Gries Reproducer Corp.

26. Zinc Die Casting Facts—Henning Bros. & Smith, Inc. has issued a booklet entitled "Die Casting with Zinc Alloy". Explains the factors influencing production of sound castings and the causes of faults and defects.

28. Die Casting Machines—Advantages of H-P-M equipment for producing quality castings at high production rates are covered in Bulletin 5700. Hydraulic Press Mfg. Company.

29. Heat Treating—C. I. Hayes, Inc., offers complete data on 11 heat treating processes.

32. Die Casting Machines—Two new hydraulically operated die casting machines are described in a catalog issued by Kux Machine Co.

33. Wax Injectors—Complete specifications and features of three models of all-hydraulic wax injection machines have been issued by Leyden Hydraulic, Inc.

35. Die Casting Machines—have certified clamping tonnage, and one-piece cast alloy frame to retain the tonnage for the life of the equipment. Full specifications are available from Lester-Phoenix, Inc.

37. Aluminum Die Castings — Litemetal Dicast, Inc. offers literature and design information on the production of castings from the size of a button to large cable spools.

43. Plaster Mold Castings—made from brass, bronze, aluminum and beryllium copper are discussed in an illustrated brochure. Ohio Precision Castings, Inc.

45. Metal Powders Report — Improved CDF powders and new MS powder are explained in literature from Republic Steel Corp. Includes data on physical properties, applications, and tooling, designing and fabricating benefits.

47. Stainless Steel Ladles & Skimmers—which are 75% lighter than cast iron and have extremely long life are described in literature offered by Spincraft, Inc.

49. Die Steel—with 5% chromium withstands extremes of service conditions, is tough, strong, highly resistant to thermal shock. Detailed data sheets are available from Vanadium-Alloys Steel Co.

51. Cleaning & Finishing Chemicals Data — Allied Research Products, Inc., offers a Technical Data File which presents a comprehensive line of chemicals for finishing, cleaning and protection of metals. Explains purposes, gives typical applications, applicable metals, appearance of film, method of application, U. S. Government specifications.

52. Barrel Finishing Handbook—Almco Queen Products, Inc. has issued 52 pages of case history facts and descriptions of barrel finishing processes. Includes detailed cost charts on finishing of typical parts.

Hydraulic Filters—available for sump or line installation in capacities from 5 to 100 GPM are described in catalogs giving dimensional charts and complete engineering data for specifying. Write to: Marvel Engineering Company, 7227 N. Hamlin Ave., Chicago 45, Illinois.

53. Finishing Abrasives—Cratex Manufacturing Co. offers a catalog and application data on rubberized abrasives for micro-deburring, smoothing, cleaning, polishing, on hard or soft metals and other materials.

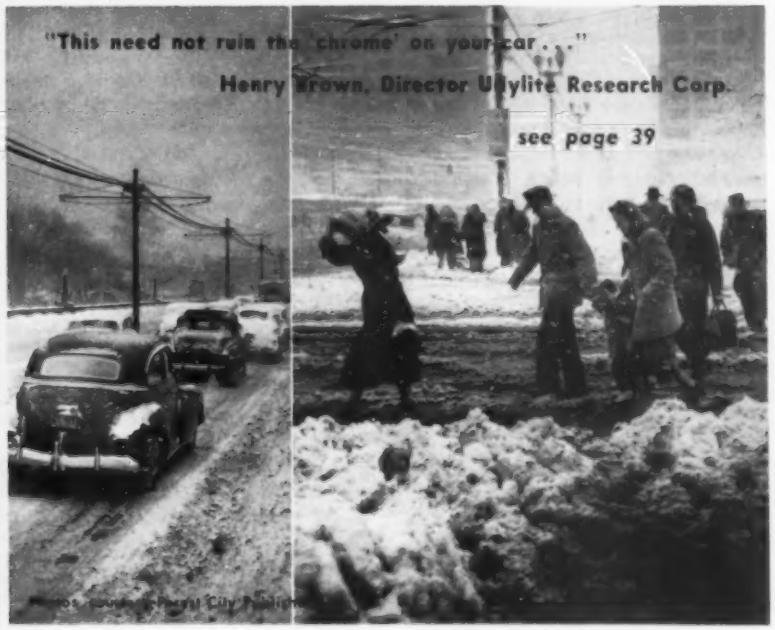
55. Paint Stripper — that is effective with epoxies, vinyls, polyesters, other hard-to-strip paints and lacquers is described in literature issued by Oakite Products, Inc.

57. Furnaces — of various designs for melting all casting metals are illustrated and described in Bulletin No. 150, issued by Stroman Furnace & Engineering Company.

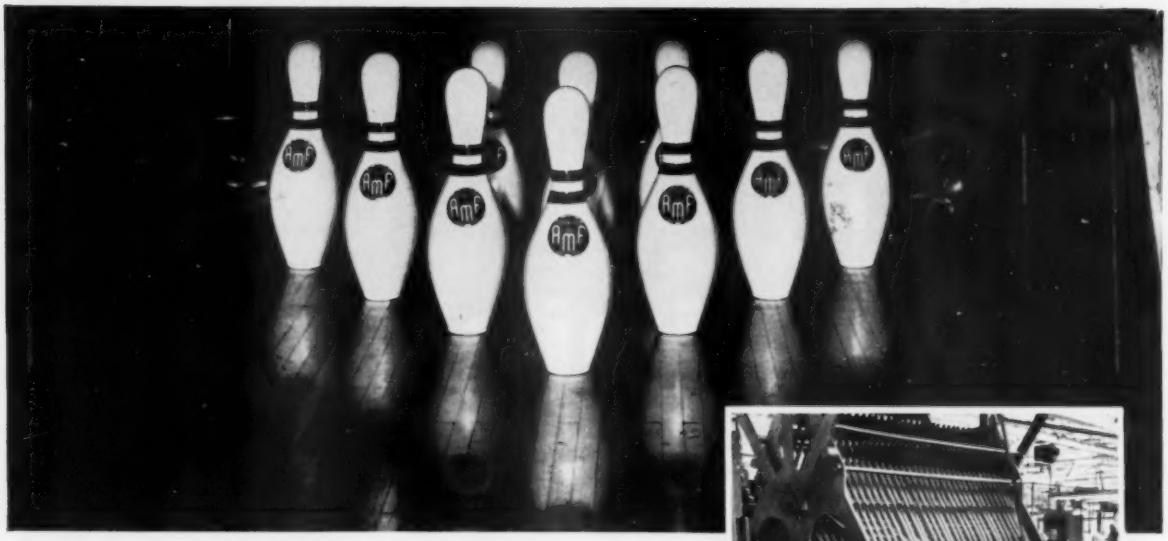
44. Vacuum Die Casting—Technical data and advantages of the Reed Vacucast system are outlined in literature from Reed-Prentice.

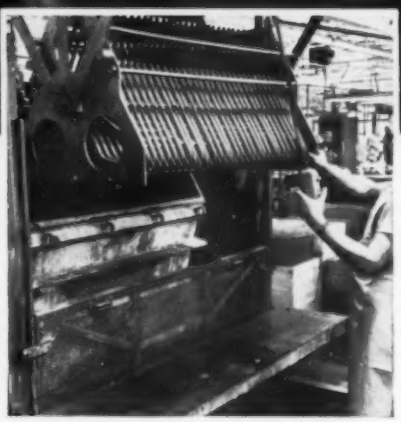
PMM Finishing Section

The specialized finishing methods, equipment and materials used to machine, assemble, surface condition or surface coat precision metal molded parts are presented here. This includes all secondary operations which convert a raw casting to a finished product.



Report from AMF... Leading Manufacturer of Automatic Pinspotters.





ALMCO Barrel Finishing Solves $37,000 Problem By Improving Finish On Track Mechanism

At American Machine & Foundry's Buffalo plant, Almco barrel finishing equipment imparts a fine microinch finish to distributor tracks used in bowling's automatic pinspotter.

HERE'S HOW ALMCO BARREL FINISHING saves American Machine & Foundry Co. $37,000 a year on an intricate product — an automatic pinspotting machine!

The pinspotter — a fully-automatic unit for setting bowling tenpins — had developed an isolated problem spot: A nylon gear which meshed with the teeth of the distributor track was rubbing against microscopic rough spots and surface irregularities. This caused the gear to wear at a faster-than-normal rate.

IMPROVING THE TRACK FINISH by usual methods required about 70 minutes for each track. Cooperation between AMF and Almco engineers, however, resulted in a special "fixture" to hold 29 track units in an Almco Model DBF-800-48-1 barrel finishing machine.

Tracks now attain a 32 microinch finish at a time rate of 10 minutes each. Costs were cut $37,000 annually, and the complete Almco installation actually paid for itself in less than five months!

Do you have a finishing problem on large parts? Or do you have smaller parts that must be accurately deburred and polished? In either case, find out what Almco barrel finishing can do for you.

ALMCO'S TECHNICAL STAFF will examine your product parts and provide sample processing. You'll get a detailed report with recommendations. No obligation, of course. Send in your sample parts with specification requirements. Your Almco sales engineer can make the arrangements, if you wish.

Sample parts processing is conducted in this modern Almco test lab. Simply write on letterhead to request arrangements or send parts direct to Almco at Albert Lea, Minnesota. Enclose specifications required.

Send for Free Barrel Finishing Handbook

52 pages of case history facts and descriptions of barrel finishing processes. Detailed cost charts on finishing of typical parts. Send for your free copy today.

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NOW — Improved Corrosion Resistance For Plated Zinc Die Castings

"... If steel could be formed in as intricate shapes as zinc die-cast, it would fail worse in outdoor exposure than zinc die-cast with the same specification plate ..." DR. HENRY BROWN, THE UDYLITE RESEARCH CORP.

Editor's Note: The following report is based on recent work by Dr. Henry Brown and his associates at The Udylite Research Corp., Detroit, Mich.

THE outdoor corrosion resistance of bright-chrome plated zinc die-castings needs to be improved, especially for the decorative trim on automobiles.

Corrosion failures appear as blisters which mar the brilliant mirror-like chrome-plated surface. With steel, the appearance of red rust signifies corrosion-failure.

A very substantial improvement in the outdoor performance of chromeplated zinc die-cast (as well as steel) [1] *can be obtained by using about 0.03 mils final chromium plate on the present thicknesses of copper and nickel plate instead of the usual 0.01 mils thickness of final chromium plate. It is important however to deposit the final, thicker chromium plate of 0.03 mils or more from warmer baths [1, 2] and higher ratios of chromic acid to sulfate than usually used.

In the past it was thought that the function of the final chromium plate was to keep the underlying nickel plate from tarnishing. The thickness of the underlying copper and nickel plate (especially the nickel plate) was entirely responsible for the corrosion protection.

This was quite true for polished dull-nickel plate on which most corrosion studies were made. This is quite untrue for fine-grained bright-nickel plate which is now almost universally used. With bright-nickel plate, both the thickness and the nickel plate and the porosity and thickness of the final chromium plate are important.

It is the porosity of the final thin chromium plate that is a key factor in the premature corrosion failure of nickel-chromium and copper-nickel-chromium plate, whether applied on zinc die-cast or steel.

Actually, the premature failures occur mainly in exposure in the industrial atmospheres of the northern cities of the United States. The industrial atmosphere contains traces of sulfurous and sulfuric acid, soot and fly-ash from the burning of coal.

The exhaust gases of automobiles contribute other acids to the industrial atmosphere. The presence of these acids in the atmosphere and their attendant concentration in the heavy dew condensation of the late autumn, winter, and early spring causes the premature corrosion of chrome-plated metal on automobiles that are not washed often and are left out-doors during the cooler part of the seasons.

The corrosive atmosphere is now further aggravated by the increased acidity of the exhaust gases from automobiles using modern gasolines, and from the tremendous amounts of salt used to de-ice the streets in winter.

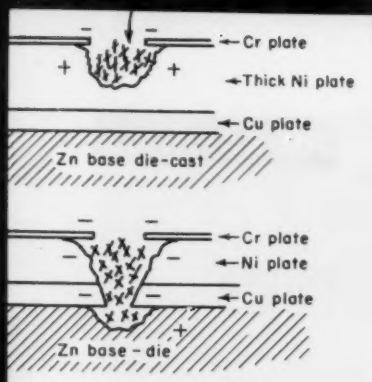
Neutral wet salt is not very harmful as the salt-spray test shows, but it is the wet salt plus acid that sets up the conditions for a severe galvanic cell.

Under such conditions, the surface of the chromium plate becomes the cathode and the underlying metal (usually nickel) exposed in the pores or stress-cracks of the bright chromium plate becomes the tiny anodes of the corrosion cell. The large cathodic areas and the very small anodic areas are exactly the conditions that favor rapid corrosion pitting of the underlying metal covered by the thin porous chromium plate.

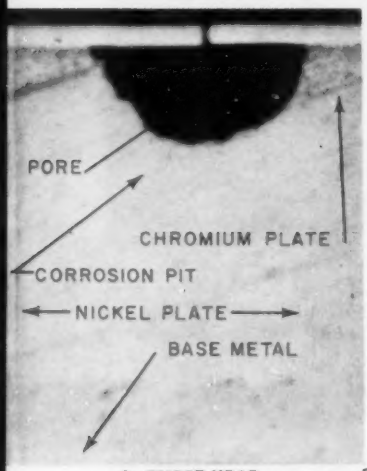
Fig. 1 illustrates this corrosion cell, and Fig. 2 is a photomicrograph of an actual corrosion pit.

From a consideration of this cor-

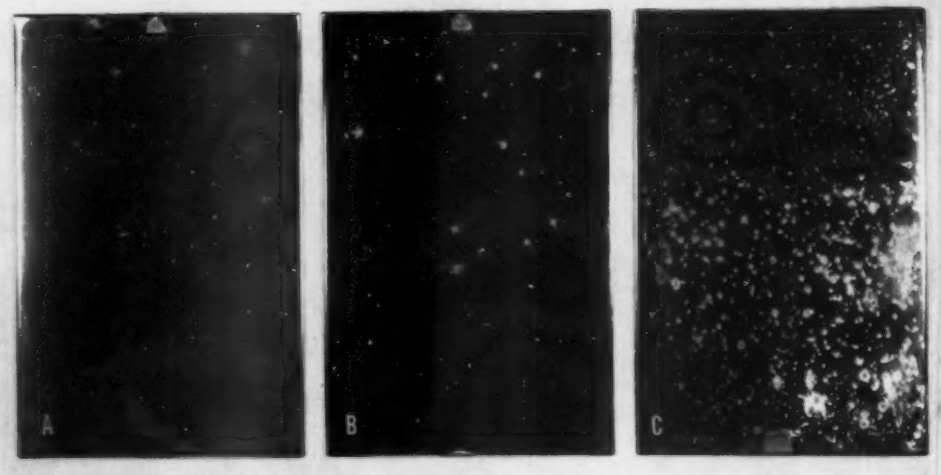
*References, page 41



1. CORROSION-progress through pin-hole failure.



2. THREE-YEAR exposure of .9 mils Ni under .07 mils Cr seen here in cross-section. 750 X.



3. ONE YEAR in an industrial atmosphere for these three test panels proved the protective qualities of chromium. All three had .4 mil Cu and .8 mil Ni. A—was best protected with .03 mil Cr; B—Medium corrosion, .02 mil Cr; C—Suffered most corrosion, had .01 mil Cr. Test area was located in Detroit area where acid foundry-gasses and auto exhaust gasses were contrated.

rosion cell it is obvious, that the thicker the underlying nickel plate or the more resistant the nickel can be made to anodic attack, the better the corrosion protection to the base metal.

Since the corrosion pit bores laterally as well as down increasing thickness of nickel plate past about 0.5 mil gives geometrically improved corrosion resistance. A 1.5 mil thick nickel plate gives much more than twice the protection a 0.75 mil thick plate would give, assuming the same chromium plate was applied.

In general, the least objectionable corrosion pit is the type that tends to widen at the top at a faster rate (at least about double or more) than the rate of penetration downwards toward the basis metal. Also the distribution density of the pores in the chromium plate is a very important factor. A very great many small pores very close together may be less harmful than a medium dispersion of pores in the chromium plate. Here the cathodic area and the anodic areas (pores) would be more nearly equal, and the rate of corrosion pitting penetration would be less.

Of course, the absence of pores in the chromium plate would be the optimum condition. Certain stress-crack patterns in the chromium plate are often really less harmful than pores because the anodic area is not concentrated to a point attack as in a pore.

The results of a study of the porosity and stress-cracking of bright chromium plate of thicknesses of about 0.03 mils to 0.08 mils thickness showed that the bright chromium plate obtained at bath temperatures of around 130° F and with ratios of chromic acid to sulfate of 120 to 1 to 175 to 1, had minimum porosity and stress-cracks.

The main drawback in the use of higher bath temperature is not the loss of brightness of the chromium plate, but the necessity of using about twice the current density (250-325 amps./sq. ft.) compared to the operation at the usual bath temperatures of 100° F to 115° F. In automatic machines or in hoistline operations, the use of low voltage (2 to 3 volts) on the entry of the work into the 130° F chromium bath before the full plating voltage (or rather current density) is applied, makes possible better chromium coverage (especially in the high ratio chromic acid to sulfate baths which tend to give "rainbows" if this procedure is not followed).

This is good practice for all chromium plating. Also at these bath temperatures and high ratios of chromic acid to sulfate, the 32 oz/gal chromic acid bath has the best throwing power[3].

In Fig. 3 are shown typical results of a year outdoor exposure in an industrial atmosphere (Detroit) of 6" by 4" zinc die-cast panels plated with 0.4 mil of copper and 0.8 mil bright nickel with 0.01, 0.02 and 0.03 mils of final chromium.

Also, for comparison, typical results on steel are shown (Fig. 4). Fig. 5 shows typical results with one of the new accelerated corrosion tests, "Corrodkote"[4],[5] which, far more accurately than neutral salt-spray, simulates the severe corrosion during the winter in industrial cities where not only acidic conditions prevail but salt is thrown on the streets to melt the ice[4].

The far superior results obtained with the 0.03 mil final chromium compared to the usual 0.01 mil chromium in all these cases is obvious. Also, the results on zinc die-cast are as good as on steel, and depend mainly on the plating, not the base metal.

There has often been a tendency in the automobile industry to regard the outdoor performance of chrome

plated zinc die-cast as inferior to that of steel.

Since the specifications for the thickness of nickel plate underneath the chromium usually call for thicker nickel plate for steel parts than for zinc die-cast, it is hardly accurate to make such generalizations. Furthermore, due to the amazingly good casting properties of the zinc base alloys, zinc die-casts of very complex and intricate shape are usually made.

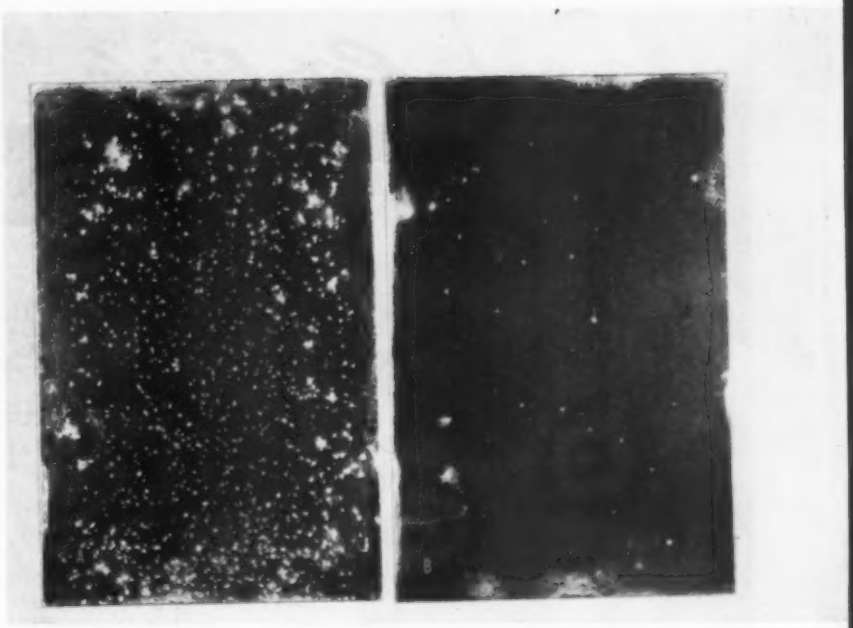
For these excessively intricate castings, it is quite difficult to plate the deeply recessed areas with specification plate. This fact, besides the generally lower specifications for plate thickness on zinc die-cast is another factor that may have lead to the erroneous generalizations favoring chrome-plated steel over chrome-plated zinc die-cast.

Actually, if steel could be formed in as intricate shape as zinc die-cast, it would fail worse in outdoor exposure than zinc die-cast with the same specification plate used for zinc die-cast.

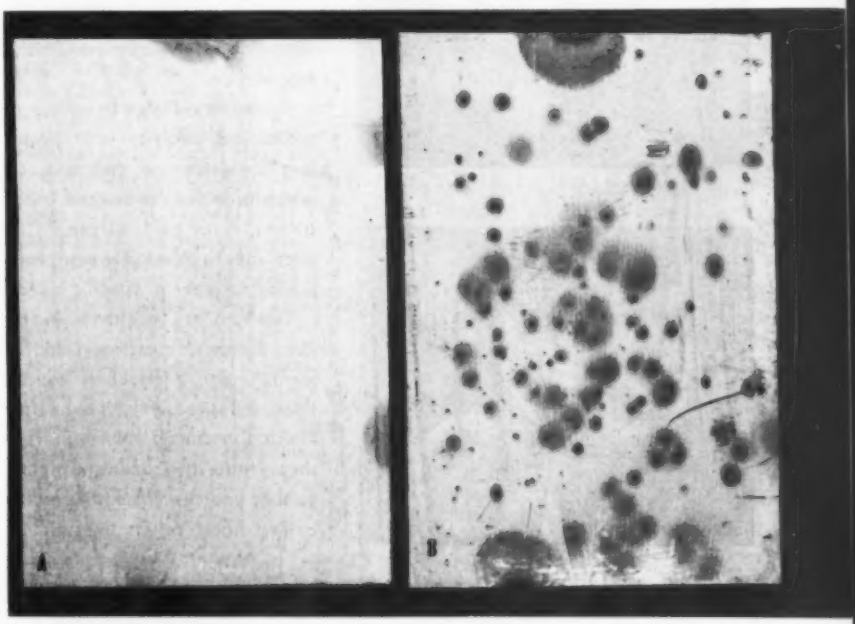
However, there is no question that the use of the 130°F chromium bath, preferably at ratios of about 125 to 1 to 175 to 1 of chromic-acid anahydride to sulfate, or any other type of bright chromium plating bath that has minimum porosity and stress, and plating about 0.03 mils to 0.08 mils thickness of chromium plate, will result in great improvement in outdoor corrosion resistance of chrome-plated die-cast zinc.

Other methods of improving the outdoor corrosion resistance of copper-nickel-chromium plated zinc die-casts are being studied, and some are already in use, such as using a dual nickel plate instead of just bright-nickel plate. The dual nickel plate consists of about 70% to 80% semi-bright sulfur-free nickel followed by thinner bright-nickel plate to brighten-up the semi-bright nickel to full luster. This type of composite nickel plate gives good results in Corrodkote and copper-chloride-acetic-acid modified salt-spray[4] [5].

In any case, the use of the thicker bright-chromium plate of minimum porosity and stress improves the corrosion resistance of any system of nickel-chromium or copper-nickel-chromium plating of zinc die-cast. By using at least 4-½ minutes chromium plating time and preferably 6 minutes or 7 minutes to obtain 0.03 mils, or even a little thicker chromium plate of minimum porosity and stress-cracks, a great improvement in the outdoor-corrosion-resistance of copper-nickel-chromium plate on zinc die-cast will result.



4. STEEL PANELS 6" by 4" after one year exposure in industrial atmosphere. A has 1 mil Ni and .01 mil Cr; B has 1 mil Ni and .03 mil Cr.



5. CORRODKOTE TEST results are seen on these panels 6" by 4" steel. A has 1 mil Ni and .03 mils Cr; B has 1 mil Ni and .01 mil Cr.

REFERENCES

1. H. Brown, M. Weinberg, R. J. Clauss, "CORROSION STUDIES WITH NICKEL-CHROMIUM PLATE", *Plating*, Feb. 1958.
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continued on page 42

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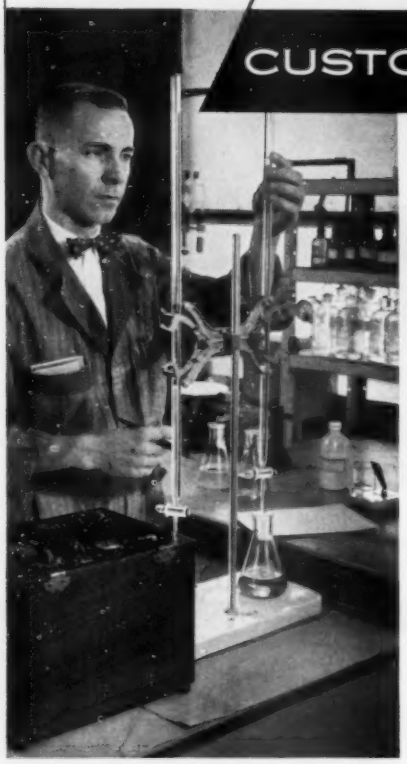
CUSTOMER'S MAN



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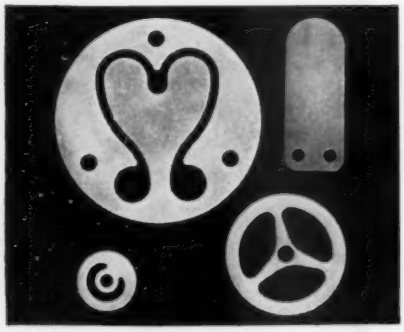

Roto-Finish CASE HISTORY

PART: Refrigeration compressor flapper valves. • MATERIAL: Swedish steel. OPERATIONS PERFORMED: Deburr. Generate full radii on all edges. Remove stress risers. • RESULT: Fatigue resistance increased 500%.

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WILLIAM PAUL NAMED VACUUM MELTING FURNACE SPECIALIST AT STOKES

William A. B. Paul, Jr., has been appointed product specialist on induction-heated vacuum melting furnaces for F. J. STOKES CORPORATION.

Mr. Paul joined Stokes last summer after twelve years of experience in industrial sales engineering and design.

AIRCRAFT CASTING ASSOCIATION FORMED

To promote the wider use of ferrous castings in the aircraft and missile fields a new organization called the AIRCRAFT CASTING ASSOCIATION has been formed. The aims of the new association are, according to the by-laws:

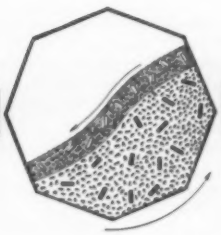
1. To promote and develop a greater interest, acceptance and use among aircraft, missile and related companies of ferrous castings manufactured from non-expendable patterns.
2. To maintain high standards of quality in the products sold these industries.
3. To promote research and development work.

Membership in the association is open to any firm, partnership, or corporation engaged in the manufacture and sale of ferrous castings in the aircraft, missile and related fields.

CORROSION

continued from page 41

4. The Corrodkote test consists of applying a coating of kaolin mixed with ammonium chloride, ferric chloride and copper nitrate, on the chrome plated article and then placing the article in a humidity cabinet kept at 98% humidity for 20 hours.
   Besides the Corrodkote, the very important and one of the earliest acidic type salt-spray test, the acetic-acid-modified salt-spray, has now been made more corrosive to shorten the testing time, by the addition of cupric chloride and raising the temperature (to 122° F) of the spray of acetic acid plus salt and cupric chloride. This test is usually run from 8 hours to 30 hours, and is also a very severe accelerated corrosion test. It is indicative of the performance of a chrome plated part on an automobile during one-year exposure in the most severe outdoor industrial atmosphere.
5. W. L. Pinner, "ACCELERATED CORROSION TESTS FOR THE PERFORMANCE OF PLATED COATINGS", *Plating*, 44, 763 (1957).



A Glossary Of Barrel Finishing Terms

Editor's note: In the July, 1957 issue of PRECISION METAL MOLDING, *a preliminary glossary of barrel finishing terms was published. Since that time the National Barrel Finishing Forum has revised the list. In this issue is the approved glossary of barrel finishing terms.*

ABRASIVE — A mineral type material, either natural or manufactured, generally having a crystalline structure which lends itself to abrading. The gross particle size may range from fine powders to relatively large pieces.

ABRASIVE COMPOUND — A material, usually in dry powder form, containing abrasive grains and chemicals. The abrasive grains are usually finely divided and may be of one or more than one type. The material may be used in conjunction with media or by itself.

ACID COMPOUND — A material with a pH under 7, used in the barrel for removal of heavy rust and scale.

ADDITIVE — A compound of any sort or a plain loose abrasive.

BALLCONES — A shape which combines the actions of balls and cones.

BALLS — A shape used as a barrel finishing media. When of hardened steel they are used for burnishing; as unhardened steel they are often used, with abrasives and compounds, for cutting-down, deburring, descaling and radii generation. Ceramic and other abrasive media are also made in this shape.

BARREL-FINISHING — The controlled processing of large or small parts in a rotating barrel containing media and/or compounds, for finishing operations such as descaling, rust removal, deburring, flash removal, degreasing, rust inhibiting, cleaning, etc.

BONDED SHAPES — Abrasive grains bonded together into special shapes to be used as media.

BOTTLE BARREL — A special shape of tilting barrel which has a rounded polygonal bottom and a narrow neck or mouth.

BRIGHTENING — The removal of surface oxidation and soil by the use of either an acid or alkaline type compound to restore the natural color of the metal.

BRIGHT DIPPING — A chemical dipping with an etching effect, to remove oxides and impurities, which might retard development of maximum burnishing results.

BURNISHING — An operation to improve color, luster and surface smoothness by smoothing down surface irregularities and closing pores in the metal. Little or no metal is removed.

BURNISHING MEDIA — Metallic or nonmetallic material, used with or without compounds to produce a burnished finish.

BURNISHING BARREL — A barrel used primarily for burnishing. Usually made of sheet steel or cast iron and provided with a lining of neoprene, plastic, rubber or wood.

BURNISHING COMPOUND — A special compound, used to give the necessary lubricity for satisfactory burnishing.

CHARGE — The amount of water, abrasive, compounds or whatever must be added to perform the job.

CHARGING — See impregnation.

CHIP BIN — See storage bin.

CHIPS — Refers to media made from naturally occurring or manufactured materials having random shape and graded to various sizes. (See media.)

COLOR — Most commonly used to *describe* surface reflectivity of a metal before, during and after finishing. This color is usually used as a means to determine whether the part has been brought to a desired brilliance.

COLORING — The act of producing the desired color on a metal part.

COMPOUND — Any additive used in barrel finishing other than water, media and work pieces. (alt) That part of the charge which controls the quality of the work accomplished.

CUT-DOWN — An abrasive operation to reduce the size of a part, to remove heavy tool, die or grinding marks, to deburr, to improve the finish or to generate radii.

CUTTING BARREL — A barrel used for deburring and heavy cut-down operations; often unlined.

CYCLE — The length of time the barrel rotates in each specific operation.

DEBURRING — Removal of burrs.

DESCALER — A compound, either acid or alkali, used in a barrel, for removal of heavy scale and rust through chemical action in addition to grinding or rubbing action.

DIAGONALS — Round rod or wire, cut at a 45 degree angle, into sections as long as the diameter of the wire.

DIMENSIONAL SEPARATOR — A mechanical device for separating parts from media which cannot be separated magnetically or by screening. Also for grading abrasive media and for separating part from part.

DISPERSION — Distribution of parts within the barrel.

FINES — The finely divided material that wears off of the larger pieces of media. May also refer to the sludge formed by the wear of the media.

FIXTURE — A rack or support used to hold work parts in the barrel.

FIXTURE BARREL — A barrel specifically designed to accommodate parts supported and held on fixtures.

FRACTURING — The breaking up of abrasive media during operation of the barrel.

GRADING — The separation of media into standard size ranges by means of screens or dimensional separators.

GRINDING — A barrel finishing operation designed specifically for the removal of surface stock from the parts being treated. This should not be confused with flash and burr removal operations. Similar to cutting down.

HARDENED STEEL SHAPES — Metal shapes employed with compound for burnishing action. Such shapes include pins, diagonals, balls, dual balls, ellipse balls and ballcones.

HIGH WATER — Water level above the top of the work load.

HOIST PAN — A pan with hoist attachment often mounted on wheels or casters; used in the mechanical loading and unloading of barrels.

HORIZONTAL BARREL — A barrel whose axis of rotation is parallel to the floor, or is level.

IMPINGEMENT MARKS — Nicks, scratches and other surface marks caused while the barrel is in operation or during either charging or discharging of the load.

IMPREGNATION — Coating or imbedding of parts by abrasive during barrel finishing operations.

LAYER ON LAYER — A specific method of loading parts and media in alternate layers.

LEVEL WATER — Water even with the top of the work load.

continued on next page

LOAD HEIGHT — The level of the total load, media and parts, in the barrel.

LOADING — Excessive smoothing or filling of the pores of the abrasive media rendering them ineffective for cutting operations.

LODGING — The wedging of media particles in holes or crevices.

LOW WATER — Water level below the surface of the work load.

LUSTER — The reflective brilliance of the surface of the part.

MAGNETIC SEPARATOR — A separating device, often equipped with an automatic demagnetizer, for separating ferrous and non-ferrous parts and media.

MASKING — The plugging or covering of holes, in critical areas to prevent lodging and/or marking.

MASS — The total volume of media and parts in a load.

MEDIA — Any material that is used to perform work on the parts or to prevent impinging. May be either abrasive or non-abrasive and does not include water and compounds.

MICROINCH FINISHING — The creation of a surface of specified smoothness (or roughness), measured as the average (RMS) deviation from a theoretically perfect flat.

NEUTRALIZER — An alkaline substance usually used to neutralize an acid condition.

NEUTRAL COMPOUND — Technically a compound having a pH of 7, in general practice a mildly alkaline compound.

OBLIQUE BARREL — See tilting barrel.

OPEN-END BARREL — See tilting barrel.

PEENING — The act of pounding parts with media. Can be purposely done to give specific surface character, or can occur accidently and result in surface defect.

pH — A unitless number used to express the hydrogen ion concentration of the barrel charge. An acid condition is expressed by a pH below 7, and alkali condition by a pH above 7 and a neutral state by pH of 7.

POLISHING — A barrel finishing operation to remove tool, die or grinding marks. Generally little or no metal is removed.

RADIUS FORMING — The rounding off of sharp corners and edges. May or may not be to a specified radius.

RIDDLE — A round hand screen, used to separate work from media or to separate media into specified sizes.

RINSING — Flushing residue from the mass before proceeding to the next operation or adding a new compound.

RINSING DOOR — A perforated barrel cover to permit rinsing without removing the work load. Also called a washout door and may be equipped with a hose connection.

SCREEN SEPARATOR — A device employing screens of known and different mesh sizes used for separating work parts and/or media.

SIZING — See grading.

SLIDE — The downward movement of the mass in the barrel during rotation past the turnover point. Much of the abrasive and/or burnishing action occurs during the slide.

SLUGS — See diagonals.

SPECIFIC SHAPES — Usually a manufactured abrasive media having a predetermined shape and size.

STONES — See media.

STORAGE BIN — A receptacle for storing media when not in use and from which it may be discharged.

SUBMERGED BARREL — A unit with a perforated drum which revolves in a tank containing a solution of water and compound.

TILTING BARREL — A barrel with an open end. In operation the open end is up to prevent discharge, but the barrel may be tilted to discharge while in operation.

TUBBING — Processing in a submerged barrel, a term peculiar to the jewelry trade.

TUMBLING — See barrel finishing. Often refers to older methods of barrel finishing prior to the advent of controlled finishing methods.

TUMBLING BARREL — Previously used to describe any type of barrel used in barrel finishing. Not generally accepted now.

TURNOVER POINT — The height along the side of the barrel at which the mass stops its upward movement and slides toward the lower part of the barrel.

WEDGING — See lodging.

WORK HARDENING — Surface hardening of work pieces by the action of the media and parts.

WORK LOAD — The parts to be finished and media, compound, water, etc.

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LETTERS

continued from page 20

familiar with the various methods of precision metal molding of parts as they should be.

I plan to use this issue as a sales tool by rearranging the various parts by method of manufacture. However, as they are printed on both sides of the paper I wonder if you could send me another copy of this issue so that use can be made of all of the articles. — A. E. H.

The entire idea we had both last year and again this year in presenting the Idea File was to stimulate thinking about parts made by the precision molding process. We hope that as a sales and reference tool the issue will prove of value to many of our readers. — Ed.

DIE CAST HOSE FITTINGS

We are interested in purchasing some die cast, male hose fittings or adapters from manufacturers who regularly make these as stock items.

We will want these fittings in ¾" IPT x ¾" hose; ¾" IPT x ½" hose; and ½" IPT x ½" hose. — L. A. McK., pres.

We know of only one die caster who might have stock dies to make these parts. If any of the die casting companies are in position to help this reader we will be glad to forward their replies to him. — Ed.

DESIGNING

continued from page 29

floor, face down, and hit each fin with an eight pound sledge.

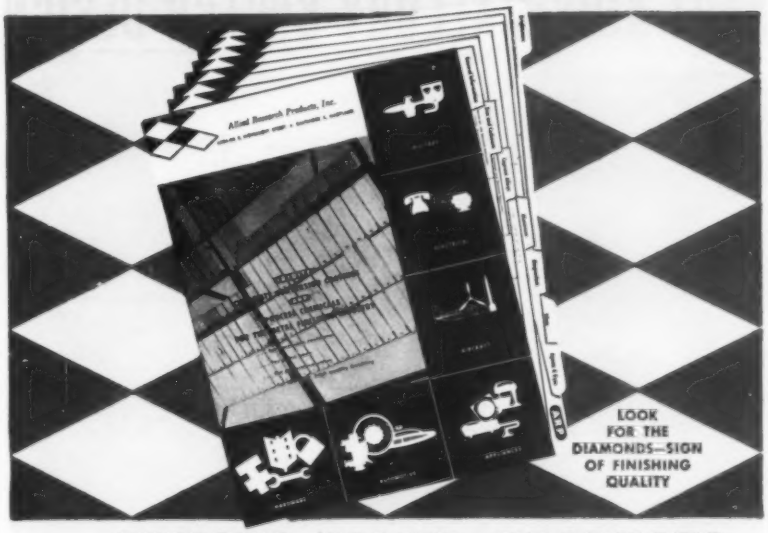
. . Stand each casting on edge and beat it with the sledge.

The results of these tests are shown in figure 4. Only the housing cast in 43 alloy stood the beating. True, it bent, but it could be straightened without cracking.

Finally convinced, Scott gave the go-ahead and Monarch has been producing these castings for over a year. Of course, some design changes have been made, but this only demonstrated the superiority of permanent mold casting. The changes were made with only minor expense and very little loss of productive time.

For information on powdered metal parts used in the Scott mower, read the article on page 32 of this issue of PMM.

Useful Technical Data File...



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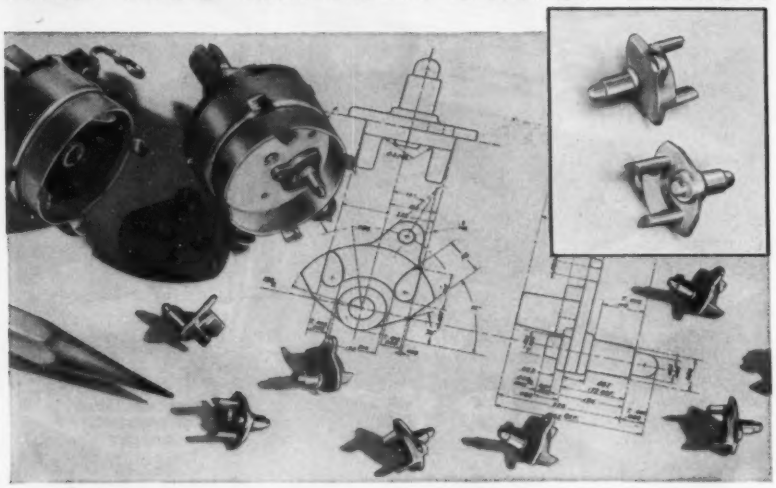
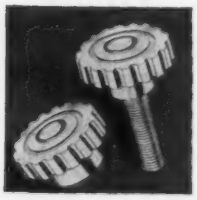
ACCURACY OF TINY GRC DIE CAST PART AIDS MALLORY SWITCH DESIGN



GRC's Extra Wide Round Thumb Nuts & Screws Easy To Grip



These unique and exclusive fasteners originated by Gries have large round heads with fluted edges, exceptionally attractive and easy to grip. Nuts are die cast in zinc alloy in both open end and closed end styles. Screws are available as a one-piece die cast zinc alloy fastener with rolled threads in plain or shoulder type and as a two-piece assembly in shoulder type only incorporating die cast zinc alloy thumb nut blanks with steel machine screws. Sizes, lengths, etc., in GRC's new Fastener Catalog. Write for copy.

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Gries' unique techniques make the most of nylon's outstanding properties — high strength to weight ratio, excellent insulation, resiliency, resistance to abrasion, chemicals, corrosion, etc. Molded nylon machine screws in standard commercial heads, slotted or Phillips type; headless set screws with various types of points; screw insulators and bushings with wide flanges to completely isolate screw from mounting surface; washers. Wide range of types, sizes, lengths, etc. Ask for spec sheets and new Fastener Catalog.

Uniformity and detail of actuator contours essential to proper functioning of special switch

A difficult parts design problem was solved with this tiny GRC die cast zinc alloy actuator which forms the basis of the Mallory OAC Line Switch for radios, television sets, record players and electronic equipment.

In a series of designs that started with a stamping and a screw machine piece involving multiple part assembly, Mallory engineers sought an actuating mechanism for a switch that would be capable of higher rating, longer life and greater dependability than switches using current-carrying springs. Such a control would require exceptional tolerances and critical dimensions to function properly. Uniformity would have to be assured as some of the contours couldn't be subjected to normal inspection procedures.

They found the answer in Gries' exclusive patented methods for the precise automatic production of tiny parts, and literally designed the switch around the GRC die casting.

Uniformly accurate, well within critical tolerances and solidly durable, this GRC actuator makes possible the simplest of switch construction.

This is just one of the many instances in which Gries ingenious methods have opened the door for new products — at substantial savings. Parts are delivered ready for use . . . assembly and other secondary operations are eliminated.

For more information ask for GRC's bulletins on small zinc alloy die castings and molded plastic parts or send prints for immediate quotations. Maximum sizes 1¾" long, ½ oz. in zinc alloy; 1¼" long, .03 oz. in plastic. No size too small.

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TOLERANCES

continued from page 27

rate alone would be around $2.00 for each part.

In other words, if we were asked to hold 40 dimensions instead of five, the cost of inspections and rejects alone would raise the price from $3.00 to $5.67 per part.

Applying the same formula to the same part, on which we had to hold only the five critical dimensions, the price would be raised to only $3.24 per part.

PIECES PER FLASK

The fourth reason we cited, a lower "number of pieces which can be put in a flask", has a very direct effect on the cost of an individual investment cast part. For after a certain point in the operation, the price structure is actually based upon the number of pieces per flask, and therefore the number of flasks we must use in a given production run. If we hold close tolerances on a great number of dimensions, we have to hold down the number of pieces per flask in order to give ourselves proper dimensional control. That means more flasks and higher part-price.

GATE REMOVAL

It's easy to see why gate removal costs go up when close tolerances are called for. Most gates are removed by hand grinding, and if the surface must be ground to $\pm$ 0.005", the grinder must stop and check many times to be sure he is in tolerance. Obviously, a tolerance of $\pm$ 0.010" is a much faster grinding operation, and since many castings have many gates, you can multiply each unnecessarily close grinding-operation by 5 or 6 or 7 to get an idea of the extra expense.

STRAIGHTENING

The last cost-increasing factor is straightening and sizing of long thin parts, or parts subject to warping and distortion. The closer the tolerance, the more expensive the fixtures needed to do the job, and the longer the operation takes. Since many parts must be straightened or sized before and after heat treating, the cost increase is frequently doubled.

We have seen how only two of the six factors described above can

increase the cost of a part from a base of $3.00 to $5.67. While it's not possible to assume even hypothetical figures for the other four factors, because of infinite variation in size, shape, etc., I think it is apparent that added together they can increase the cost by very much more.

THE SOLUTION

A knowledge of these factors, and how they affect costs, can help a designer use the investment casting process to its fullest and most economical degree.

A wise user will hold tolerances to ± 0.005" only where necessary, and will open up the other tolerances. The freedom of operation which the foundry then has permits it to do even a better precision job in those areas which are critical.

Frequently, cost savings can be realized and greater accuracy achieved by finish-machining a part to very close tolerances.

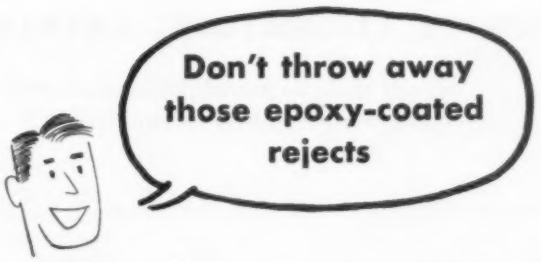
Perhaps most important of all, however, is this: The wise user of investment castings will call upon the casting foundry's knowledge and experience. For if the foundry knows how a part is to be used, what surfaces will be machine-finished, and other important facts, it can usually produce a *better* part at *less* cost to the user.

To illustrate this point, one user was perplexed when he got quotes from several reputable investment casting foundries, ranging from $3.50 to $9.00 for exactly the same part. However, he soon discovered that they all had varying amounts of knowledge on how the part was to be used, and the engineering difficulties involved. When they were all armed with the same information, the quotes levelled off at about the $6.00 mark.

And most important of all, by consulting with the foundries he got a part ideally suited for his own use, and for the investment casting process, at the most economical price possible.

DURA-BOND ACQUIRES SANDSHELL CORP.

Non-ferrous shell mold castings will be manufactured by the DURA-BOND BEARING CO. through the recent acquisition of the Sandshell Corp. The company will produce shell mold castings in brass, bronze, and aluminum alloys.



Here's a new paint stripper that will save them

Do you scrap perfect metal parts that have been imperfectly coated with epoxies, vinyls, polyesters and other hard-to-strip paints or lacquers?

In the last few months, users of Oakite Stripper S-A have eliminated many such losses. Here's what some of them say about it:

CALIFORNIA: An aircraft manufacturer tested many strippers on an epoxy designed to resist attack by hydraulic fluid. Finally found that Oakite Stripper S-A is "the only one that safely strips this paint from anodized aluminum."

NEW YORK: A camera maker coats flash bulb reflectors with black vinyl paint outside and aluminum paint inside. "Stripper S-A is the fastest ever used on our rejects."

OHIO: A maker of toy pistols had trouble stripping alternate coats of lacquer and metallized aluminum. Now "Stripper S-A does it amazingly fast and remetallizing is completely satisfactory."

CALIFORNIA: A producer of metal furniture uses Stripper S-A to remove clear epoxy from plated parts. Chemist says "This is the best stripper on the market."

ALABAMA: A hardware maker had trouble stripping lacquer from brass door knobs. Oakite Stripper S-A now does the work in "less than ⅓ the time taken by any other stripper."

NEW YORK: A manufacturer of business machines tested several strippers on various finishes on steel and aluminum. Verdict in favor of Stripper S-A was: "It's doing a wonderful job."

CONNECTICUT: A maker of brass lipstick shells has found that "Stripper S-A quickly strips epoxy lacquers from rejects and heavily coated work spindles."

CALIFORNIA: A missile maker reports that "Stripper S-A is doing a fine job stripping vinyl from stainless steel and titanium."

FREE Write Oakite Products, Inc., 34G Rector St., New York 6, N. Y., for complete information on Oakite Stripper S-A.

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PROCESSES

Precision Castings: 167

NEWARK DIE HOBBING AND CASTING CO.—A new booklet depicts methods of producing castings by the "New-Cast" process, under a licensing agreement with Shaw Process Development Corporation. A special type of ceramic mold is used which gives dimensional accuracy, surface smoothness and freedom from sand or glass inclusions.

Casting Facilities: 168

HAMPDEN BRASS & ALUMINUM COMPANY—Booklet explains how the company manufactures die castings, sand castings, permanent mold castings and molded fiberglass parts. Photos show equipment and examples of quality castings produced.

Investment Castings: 169

GRAY-SYRACUSE, INC.—Bulletin presents advantages and practical limations of investment casting ferrous and non-ferrous alloys, lists tolerances and finish obtained. Five pages of illustrations show kinds of parts which are economically cast with this process.

Zinc Die Castings Savings: 170

DIECO DIE CASTING CO.—A brochure tells how the company produces castings at minimum cost, and explains facilities for designing the product, building the die, finishing the casting.

Investment Casting Design: 171

ARWOOD PRECISION CASTING CORP.—Reprints of an article entitled "Tolerances and Specifications for Precision Investment Castings" are offered. Explains capabilities of the process, tells how tolerances affect costs, and how to specify inspection standards for best economy.

Special Alloy Castings: 173

NATIONAL ALLOY DIV., BLAW-KNOX COMPANY—Bulletin 2537 covers high temperature corrosion and abrasion resistant castings, describes the company's production facilities and laboratory, illustrates typical castings produced. Two tables give temperature properties of various heat resistant alloy castings, composition and uses of the company's alloys.

Powder Metallurgy Products: 181

AMPLEX DIVISION, CHRYSLER CORPORATION—Bulletin CS-56 explains production and uses of self-lubricating bearings, finished machine parts, and porous metal filters. Typical properties, performance data, and recommended design features are also given.

Permanent Magnets: 185

THE INDIANA STEEL PRODUCTS COMPANY—More than 70 Cast Alnico V magnets and 30 Sintered Alnica II magnets are presented in Catalog No. PR-19. Information on demagnetizers and a complete line of electro and permanent magnetizers is included.

Metal & Plastic Processes: 165

AINSWORTH-PRECISION CASTINGS CO.—Folder gives design and production data about die casting, stamping, precision machine parts, metal forming, plastic molding, welding, assembly, automatic plating, polishing and buffing, painting and die making.

Aluminum & Zinc Castings: 186

MONARCH ALUMINUM MFG. CO.— A brochure explains the company's system of mass-producing aluminum permanent mold castings and aluminum and zinc die-castings, and discusses machining and specialized finishing operations.

MATERIALS & EQUIPMENT

Powder Metals Facts: 154

PLASTIC METALS DIV., NATIONAL-U.S. RADIATOR CORP.—Bulletin No. 2 tells how metal powders are manufactured, includes photos of facilities. Descriptions of standard ferrous and non-ferrous powders are given, along with information on utilization.

Sintering Furnaces: 155

DREVER COMPANY—Bulletin B-101 contains specifications, features and photos of a series of electric and gas-fired furnaces. Models range in size from hand-operated batch furnaces for small capacity requirements, to automatic roller-hearth giants for very high production.

Push Button Compacting: 156

KUX MACHINE CO.—New compacting presses, with capacities from 50 to 500 tons, were designed for extreme convenience and versatility: adjustments for die fill, pressure, ejection and timing sequence are made from a single control panel. Bulletin covers all features in detail.

Powder Specifications: 157

THE AMERICAN METAL COMPANY, LIMITED—Handbook C-14 gives uses, product descriptions, properties of electrolytic copper, copperbase alloy, tin, solder and silver powders.

Machining Data:

MEEHANITE METAL CORPORATION—Bulletin No. 29, "How to Machine Meehanite Castings", contains 20 pages of facts on all types of machining operations with this metal. Useful as a set-up guide; gives exact details as to feeds, speeds, depths of cut, type of tool, etc. Write on company letterhead to Meehanite Metal Corporation, 714 North Avenue, New Rochelle, New York.

Heat Processing: 174

SELAS CORPORATION OF AMERICA—Booklet illustrates applications of controlled heat as an industrial processing tool. Modifying and processing of gases and liquids by use of micro-porous membranes is also presented.

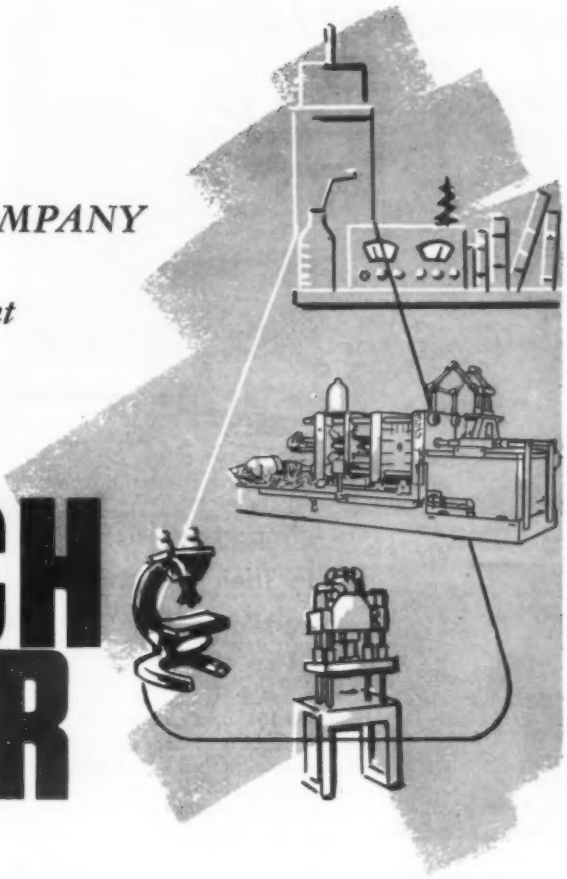
continued on page 50

B&T MACHINERY COMPANY

announces the establishment

of a new

RESEARCH CENTER



for the use of DIE CASTERS

. . . well equipped, individually located, and entirely non-commercial, this center is dedicated to the advancement of automation, the use of vacuum attachments, control of temperatures, lubricants, variable shot control and other phases of the die casting art.

All Die Casters are cordially invited to use these facilities as a possible perfection of their die casting technique.

B&T MACHINERY COMPANY manufactures a complete line of Die Casting Machines, both cold chamber and gooseneck types, in capacities of: 100, 200, 300, 400, 500, 600, 750 and 800 tons. Also Hydraulic Presses.

PRECISION BUSS MACHINERY

B & T MACHINERY COMPANY

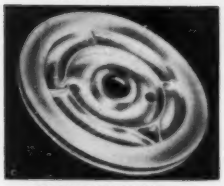
201-217 WEST EIGHTH ST., HOLLAND, MICHIGAN • PHONE EXport 2-2341

SUBSIDIARY OF BUSS MACHINE WORKS — MANUFACTURERS OF MACHINERY SINCE 1862
REPRESENTED IN CANADA BY UPTON BRADEEN & JAMES, LTD.

For more information circle No. 10 on the Reader Service Card

ALUMINUM DIE CASTINGS
for
OUTBOARD MOTORS

OUTBOARD MOTOR STARTER HOUSING

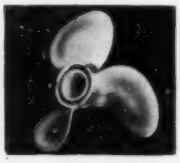


OUTBOARD MOTOR STARTER PULLEY

—Important Factors In Their Increasing Popularity

DRIVESHAFT HOUSING

EXHAUST and PROPELLER GEAR HOUSING—below ALUMINUM PROPELLER



Literally, 101 applications are found for the use of aluminum die castings—ranging from the starter on top, down to the propeller — on today's dependable lightweight outboard motors. Unquestionably the use of aluminum die castings has played a major role in making practical the increasing use and enjoyment of outboard motors by millions of Americans. Their advantages are many: great savings in weight, corrosion resistance and minimum of machining required for finishing.

Note in the photographs above, the inclusion of mounting bosses in the castings which reduces assembling costs. The starter pulley, by LITEMETAL, shown above, includes the addition of brass inserts to afford greater wear resistance. Why not consult our designers . . . whatever your field of manufacture.

Let's Talk It Over . . .

LITEMETAL DICAST, INC. is an organization of specialists — men thoroughly experienced in the casting and machining of magnesium and aluminum alloys. Our equipment includes big machines for big jobs — little machines for little jobs . . . the right sizes and types of the most modern die casting equipment for producing parts from the size of a button to large cable spools. Complete facilities for secondary operations are also available.

Write today for literature and design information. Quick action on inquiries.

LITEMETAL DICAST, Inc.
A SUBSIDIARY OF HAYES INDUSTRIES
1925 WILDWOOD AVE · JACKSON, MICHIGAN
PLANT AND EXECUTIVE OFFICES

For more information circle No. 37 on the Reader Service Card

FINISHING

Chemical Milling: 166

UNITED STATES CHEMICAL MILLING CORP.—A brochure explains the technique of controlled removal of metal by chemicals, and presents facilities for accurately milling parts up to 55 feet in length. Design Bulletin supplements list applications, material selection factors and blue print requirements.

Finishing Machinery: 159

HAMMOND MACHINERY BUILDERS, INC.—Catalog 90 gives brief descriptions and photos of a complete line of machinery for polishing, buffing, grinding, dust and mist collecting. Catalog 50 lists comprehensive data on rotary indexing and straight line automatic polishing and buffiing machines for high production.

Barrel Finishing System: 160

ALMCO DIV., QUEEN PRODUCTS, INC.—"Supersheen" roll barrels, for processing parts in small or large lots, are rotated in numbers of 1 to 6, depending on cabinet selected; they can be removed with a built-in hoist boom for loading-unloading without stopping the machine.

Solvent Cleaner: 161

ENTHONE, INC.—Emulsion Cleaner 62 is a gold-colored liquid furnished either in ready-to-use form or as a concentrate. Immersion in the cleaner at room temperature for 5 to 60 seconds completely precleans metals for plating, phosphating or blackening. Literature explains other advantages of the product.

QUALITY ✓ PRICE ✓ DESIGN ✓
CAPACITY ✓ DELIVERY DATE ✓

All things check
at CHARLES ZAPF & CO.

from the blue print to the finished die casting die. We are prepared to produce the best possible mold to meet your exacting requirements.

Our staff of experienced designers, engineers and mold makers, working with modern equipment, assures you of a job well done.

Our equipment includes the latest Keller and Hydrotel with capacity of molds up to four tons.

We are licensees of the Shaw Process for precision casting of cavities & cores in hot work tool steels.

Die Casting Dies

CHARLES ZAPF & CO.
2425 MAIN STREET EVANSTON, ILL.
Phone DAvis 8-0333

For more information circle No. 50 on the Reader Service Card

Low-Cost Automatic Polishing: 162

MURRAY-WAY CORP.—"Junior Automatic" finishing machine costs only a fraction of regular automatics, consists of a basic dial table with four, powered work spindles and optional manual or automatic indexing with adjustable dwell; refinements can be added to the basic unit as needed. Illustrated bulletin with prices and complete details available.

Vertical Parts Washer: 163

RANSOHOFF, INC.—Conveyor type washing machine occupying only 44 sq. ft. gives floor space savings of 175% over conventional horizontal type. Machine also serves as an elevating transfer conveyor, since parts discharge from a chute 6 feet above floor level. Complete specifications are given in literature.

Spray Cleaning Compounds: 164

MACDERMID INCORPORATED—A line of cleaners designed for use in power spray washing machines is fully described in Technical Data Sheet No. 7, a five-page usage and instruction sheet. Free rinsing, non-foaming and of maximum detergency, the compounds cover most cleaning problems.

Centrifugal Machinery: 175

THE LEON J. BARRETT COMPANY—A new 16-page product brochure depicts and describes centrifugal machinery; includes oil extractors, dryers, washers, washer-dryers, oil recovery and reconditioning systems, galvanizers, breakers, and impregnators.

Grinding Equipment: 158

HYPREZ DIV., ENGIS EQUIPMENT CO.—Literature gives features, specifications, prices of diamond files, a reciprocating hand machine for die-profiling, and a tool finishing machine.

For more information circle No. 23 on the Reader Service Card

FISKE'S DIE CASTING COMPOUNDS

These compounds are made in several grades to meet various application requirements such as brushing, swabbing, or spraying. Permit greater production because of more pieces between applications. Improves surface finish . . . prevents sticking and soldering . . . minimizes carbon formation . . . reduces fumes and smoke. Bulletins describing Fiske's Die Casting Compound and other specialty lubricants and coolants sent on request.

FISKE'S *Since 1870*

METAL WORKING LUBRICANTS

FISKE BROTHERS REFINING CO.

1290D LOCKWOOD STREET, NEWARK 5, N. J.

Plants: Newark 5, N. J. and Toledo 5, Ohio

THIS 3 in 1 CASTING

SLASHED SMALL PARTS COSTS MORE THAN ***50%***

This latching cam WAS a 3-piece unit that cost $4.946, completely machined and assembled. Now, it IS a single OPC Manganese Bronze casting that costs just $2.410, completely finished. And each casting is individually checked to make certain the sprocket tooth form fits perfectly into a #40 standard roller chain.

An astute buyer and a knowledgeable OPC man worked together to affect this tremendous saving on small parts for S & C Electric Company. An equally astute buyer could call in the OPC man and quite likely make equally substantial savings on your small parts.

For a start, write for our illustrated brochure that contains many other examples of cost-cutting with OPC castings.

OPC **OHIO PRECISION CASTINGS, INC.**

P. O. Box 55, Sta. A . . . . . DAYTON 3, OHIO

Plaster Mold Castings made from

BRASS • BRONZE • ALUMINUM • BERYLLIUM COPPER

For more information circle No. 43 on the Reader Service Card

CUT COSTS SAVE TIME IMPROVE QUALITY

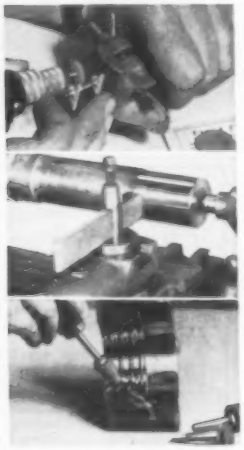
use ***CRATEX*** Rubberized Abrasives

for MICRO-DEBURRING, SMOOTHING, CLEANING, POLISHING on HARD or SOFT METALS and other materials

- 4 grit textures

Course — C • Medium — M
Fine — F • Extra Fine — XF

WHEELS - POINTS - BLOCKS STICKS • CONES for power or manual application and dimensional control. ***CRATEX*** is sold through leading industrial supply distributors.



For actual field application reports on how ***CRATEX*** "cushioned action" can cut costs in your own operations, send this coupon.

CRATEX **MANUFACTURING COMPANY**

1600 ROLLINS ROAD, BURLINGAME, CALIFORNIA

● Please send Catalog and ***CRATEX*** Application data for:

Name ..... ☐ Stainless Steel
Title ..... ☐ Aluminum
Company ..... ☐ Brass & Bronze
Street ..... ☐ Cast Iron
City ..... Zone ..... State ..... ☐ Heat-treated Steel ☐ Special Alloys

For more information circle No. 53 on the Reader Service Card

SHAW PROCESS

continued from page 25

extreme accuracy that can be held by this process, since there is no gross expansion of the mold. A Shaw mold is always the same size regardless of the pouring temperature of the metal. Since no dimensional variation occurs in this mold from the time it leaves its pattern to the time steel is poured into it, the only dimensional variable in the process is the solidification shrinkage of the molten steel.

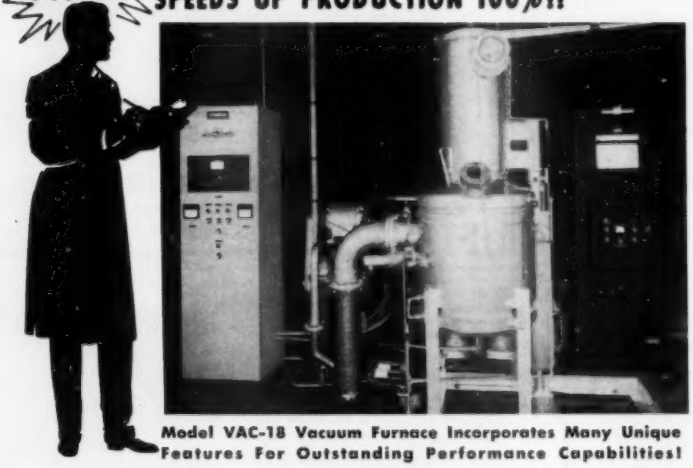
Mold structure will not spall and will not wash; therefore, the tool steel castings are extremely clean and free from any non-metallic inclusions. Probably the most important factor in our findings has been that these castings can be chill-cast, that is, poured into cold molds. The result is an extremely fine-grained surface skin which we believe is the major cause of the excellent die-life figures which Shaw Process cast tools have been showing.

3. *Permeability* – The fine sys-system of craze-cracks makes for excellent venting of the Shaw mold. Complete permeability results in excellent reproduction of fine detail without any sharp corners being lost due to the entrapment of air or gases. No gas inclusions are found in these castings when the metal is properly degasified prior to pouring.

4. *Finish* – With finely graded refractories which are inert to chemical reaction, and by controlling the Shaw Process to the stage that the micro-crazes are of such a size that they will not permit the penetration of the molten steel, surface finishes can readily be cast that are superior to those obtained by conventional machining.

Part Two of this extremely important article on the Shaw Process will appear in the August issue of PMM— Editor.

NEW HAYES *Vacuum* HEAT TREATING FURNACE SPEEDS UP PRODUCTION 100%!!



Model VAC-18 Vacuum Furnace Incorporates Many Unique Features For Outstanding Performance Capabilities!

MODEL VAC-18 FEATURES . . .

- **Temperature Range . . . from 700°F to 2150°F.**
- **Vacuum . . . set to operate at 0.1 micron, but will operate at different vacuums . . . as required.**
- **Heating element of completely new design . . . operates at low voltage; allows heavier, self-supporting construction; eliminates need for refractory inside furnace.**
- **Heating element operates on 3 phase current; arranged to come to uniform temperature; of simple construction, relatively inexpensive, and easily replaced; water-cooled leads and terminals.**
- **"Hard-to-clean" baffles eliminated from inside unit . . . entire inner chamber of nickel-clad steel to speed up heating cycle.**
- **Hydraulic lift raises unit head (and integral cooling chamber) to facilitate work handling.**
- **Water-cooled, fully jacketed chamber throughout . . . except for weld areas subjected to vacuum.**
- **Saturable Reactor type power control maintains temperature of element . . . eliminates "on-off" control.**

Metallurgical vacuum processing advances another great step toward meeting the severe performance demands of modern industry . . . with the introduction of the new Hayes Model VAC-18 Vacuum Heat Treating Furnace. Many unique features are incorporated in its design . . . to speed up the heating and cooling cycles . . . to facilitate work handling . . . and to improve process control and work-heating qualities.

Request complete information on these and other design features that make the Hayes Model VAC-18 Vacuum Furnace so completely new and outstanding in performance characteristics. Improve your product, increase output, and reduce unit costs . . . with GUARANTEED RESULTS! Let us show you what over fifty years experience in developing the well known line of CERTAIN CURTAIN electric furnaces and allied equipment can do for you. Write today!!

Free Literature

Please send complete data on the heat treating procedure checked here —

☐ Vacuum Heat Treating ☐ Stainless Steel Heat Treating
☐ High Speed Hardening ☐ Sintering
☐ Tool Steel Hardening ☐ Copper Brazing and Soldering
☐ Carbo-Nitriding ☐ Lead Pot Hardening and Tempering
☐ Tempering ☐ Atmosphere Equipment
☐ Bright Heat Treating ☐ Other . . . . . .

ELECTRIC CERTAIN CURTAIN FURNACES

C. I. HAYES, INC.

Established 1905

819 WELLINGTON AVE. • CRANSTON 10, R. I.

TARDIFF APPOINTED MANAGER H-VW-M EQUIPMENT SALES

M. A. Tardiff has been appointed manager of general equipment sales for HANSON-VAN WINKLE-MUNNING CO. The move is a part of the general reorganization that started earlier this year. To place

M. A. TARDIFF

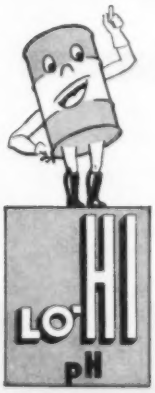
increased emphasis on research and new product development, the entire engineering division has been reorganized. As a part of the reorganization and new emphasis the company is building a new mechanical and electrical laboratory and expanding the facilities of its electro-chemical laboratory.

For more information circle No. 29 on the Reader Service Card

YOU PLATE METAL
YOU PAINT METAL
YOU FINISH ALUMINUM
YOU STRIP ORGANIC FINISHES

NORTHWEST'S CHEMICALS DO IT BETTER!

Remember —YOUR COST PER FINISHED ARTICLE IS THE TRUE COST OF YOUR CLEANER



Northwest's years of research in formulating and perfecting analytically correct, job-adjusted cleaners are your assurance of the right chemical for your job.

Northwest's Metal Cleaning Specialists have at their command such outstanding processes as LO HI pH—for cleaning prior to plating, painting or vitreous enameling; ALKALUME—for preparing aluminum for finishing and spot welding; INTERLOX—for phosphate coating; SPRA-LUBE—to control overspray of "todays" paints in water-wash paint booths; PAINT STRIPPERS—specific to your needs; SUPER-DRAW AND FLUID FILM—for drawing metals.

Northwest's production-tested chemicals and "Right the First Time" recommendations will save you money. Your Northwest Cleaning Specialist is as close as your phone.

Northwest products are manufactured on the West Coast by
ALERT SUPPLY COMPANY, Los Angeles

NORTHWEST CHEMICAL CO.

9310 ROSELAWN DETROIT 4, MICH.

pioneers in pH cleaning control *serving you since '32*

For more information circle No. 54 on the Reader Service Card

Dodge Custom-made **Special Alloy Steel Goosenecks**

. . . for longer service life

. . . less maintenance

Here's the biggest news in die casting in years: a custom-made special alloy *steel* gooseneck that will outlast and outperform iron and alloy iron goosenecks currently available . . . and provide greater operational savings! Developed through years of experience and association with the die castings industry, Dodge Special Alloy *Steel* Goosenecks provide many advantages:

- Will outlast iron and alloy iron goosenecks by as much as 4-5 years.
- Maintenance problems are fewer because of long service life.
- Down time is reduced to a minimum because of long service life.
- Designed and made of special alloy *steel*, they prevent cracking . . . bottom breakout . . . spout erosion.

Each Dodge Special Alloy *Steel* Gooseneck is custom made to specifications by the Finished Products Division of Dodge Steel Company. Facilities are available for producing any size gooseneck for any die casting machine. Goosenecks are furnished either rough machined or machined with sleeves. Dodge provides a complete engineering service in the designing and production of steel goosenecks.

Your inquiries are solicited, without obligation, of course. Ask too, about pots and other die casting machine parts including nozzles, spouts, plungers, etc.

DODGE STEEL COMPANY

FINISHED PRODUCTS DIVISION
6501 Tacony Street
Philadelphia 35, Pa.

THE MOST IMPORTANT ALLOY IN A STEEL CASTING IS QUALITY

circle No. 19 on the Reader Service Card

AINSWORTH-PRECISION APPOINTS C. A. HAAG

Charles A. Haag has been appointed by AINSWORTH-PRECISION CASTINGS CO., Detroit, Mich., to

C. A. HAAG

head its Eastern Division's production facilities.

Mr. Haag has been with Ainsworth-Precision and its predecessor firm, Precision Castings Co., for 33 years. Several months ago Precision Castings merged with the Ainsworth Manufacturing Co. to form Ainsworth-Precision Castings Co.

CARBORUNDUM OPENS NEW LABORATORY

The Electro Minerals Division of THE CARBORUNDUM COMPANY has opened a Product Development Laboratory.

The Electro Minerals Division manufactures crude silicon carbide and aluminum oxide, abrasive grains and powders, tumbling nuggets, boron carbide, other carbides and oxides.

The new laboratory was built to meet the increasing demand for technical information, not only for the Division's established products, but also for its new and improved product lines. The new facility contains a wide variety of laboratory equipment for product development and testing. It also provides pilot plant facilities for developing the manufacturing processes required for new products and the improvement of processes used in existing plants.

ATOLS

TOOL AND MOLD CORPORATION

DESIGNERS & FABRICATORS

of

QUALITY MOLDS

for the

DIE CASTING INDUSTRY

Complete designing and engineering. Modern plant & equipment includes BG-21 4' x 6' & BL-3620 Keller Duplicators.

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BErkshire 7-0800

circle No. 8 on the Reader Service Card

REPUBLIC STEEL REPORTS ON...

PROJECT 501

PHASE #1

IMPROVED CDF POWDERS

I—PHYSICAL PROPERTIES

A. Higher tensile strengths.

B. Greatly improved compressibility.

C. Higher elongations in the presence of copper.

D. Higher apparent density.

E. Predictable dimensional characteristics retained after sintering.

II—APPLICATIONS

Improved *Controlled Dimensional Factor* Powders—Type "G" for growth, Type "N" for normal or zero dimensional change, Type "S" for high shrinkage after sintering—are ideally suited for the molding and manufacture of mechanical parts.

III—TOOLING, DESIGNING, FABRICATING BENEFITS WITH CDF

A. Tool engineers can design tools to part-print dimensions with the assurance that tolerances, transverse to the direction of pressing, can be held within ±.001 inches per inch with copper additions.

B. Design engineers are aided in establishing final part dimensions by consistently uniform shrinkage and growth values. These predetermined values never vary from lot to lot.

C. Fabricators benefit from faster production, reduced costs, minimum scrap loss, production of a greater number of uniform parts per pound of powder.

PHASE #2

NEW MS POWDER

Republic's new MS is a soft, higher purity powder with excellent carbon compatibility.

I—PHYSICAL PROPERTIES

A. Tensile Strengths—In the presence of a 1% graphitic condition, physical properties can be obtained ranging from 42,000 psi at 6.1 sintered density to 53,000 psi at 6.5 sintered density.

B. Compressibility—

Briquetting Pressures		
20 tons at 6.0 30 tons at 6.4 40 tons at 6.65 50 tons at 6.8	}	Green Density

C. Dimensional Change—From —.001 inches per inch at a 5.95 green density to a +.002 at 6.7 green density.

D. These values obtained by sintering in an Endo Thermic Atmosphere: air-gas ratio 2.5 to 1; dew point +10° to 13°F; 2030°F; 45 minutes at heat.

II—APPLICATIONS

A. Can be used for comparable strength structural parts at *lower cost* than obtainable with copper.

B. Ideally suited for use in electrical part and electric motor applications—pole pieces, cores, armatures, etc.

C. Can be used to fabricate larger parts on normal pressing equipment. MS Powder's softness makes this fabricator benefit possible.

Write Dept. PM-5476, 1441 Republic Building, Cleveland 1, Ohio, for complete facts on improved CDF Powders and the new MS Powder.

REPUBLIC STEEL

GENERAL OFFICES • CLEVELAND 1, OHIO

World's Widest Range of Standard Steels and Steel Products

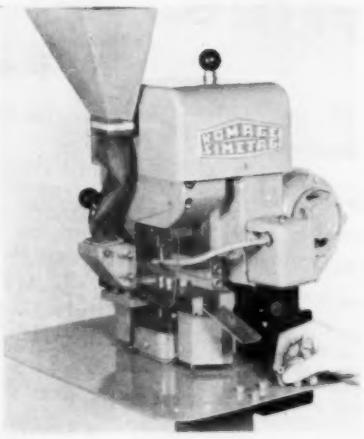
NEW PRODUCTS AND DEVELOPMENTS

Want complete details on these announcements? Use the Reader Service Cards. You'll find them facing page 32 of this issue

HIGH SPEED MECHANICAL MOLDING PRESS

The new type K-3 Komage-Simetag mechanical molding press was developed for high production briquetting of all powdered materials, including metal powders, ferrite and ceramics.

The press operates on a simplified design of the well known withdrawal tooling principle. The lower punch is held stationary during the press and withdrawal portions of the pressing cycle, while the die table, which is part of the machine, floats for lower punch pressure and ejection. Divided lower punches may be used for molding shapes of more than one pressing level.



The cast iron press frame has an accurately machined dove-tailed way on which both cross head and press table slide. Adjustable gibs on each side of both the cross head and the die table permit perfect alignment of punches and dies and also provide a means of adjusting for normal wear of the machine ways.

Length of stroke of the upper ram, filling depth, and withdrawal distances of the press table are all adjustable. The shuttle box which carries powder to the die has a built-in shaker for uniform filling of the die cavity.

Circle No. 205 on Reader Service Card

NEW FINISHING MACHINES DEBURR & POLISH UP TO 960 PIECES PER HOUR

More than 75 Rotomatic machines are currently being used to finish such diverse parts as refrigeration compressor components, jet engine blades, and heavy steel steering knuckles.

The fixture-actuating mechanism is air-operated, either automatic or linked to a foot pedal at the operator's station; a cam-operated, automatic device raises and lowers the spindles.

Designed and manufactured by Roto-Finish Co., the machines are used primarily for deburring. Roto-Finish Co. claims, however, that users have found the Rotomatics to be extremely effective for: (1) polishing and surface improvement; (2) very fine micro finishing on the order of 3 to 4 RMS; and (3) stress relief. The machine uses a fine abrasive media, normally between 8 and 14 mesh, to obtain these high polishing and surfacing results. Stress relieving is accomplished by the elimination of stress risers in the parts being processed. The inside diameters of parts such as inside gears and hydraulic pistons can be deburred and polished.

Circle No. 206 on Reader Service Card

TWIN AUTOCLAVE UNITS HAVE AUTOMATIC SAFETY CONTROL

A new Model P-200 series of low-cost twin-autoclave impregnation units has been announced by Prenco Manufacturing Corp. Designed for economical batch impregnation of pressure castings of all kinds, the machines can be used with either plastic or metal oxide type sealing materials.

The equipment includes a large sealant supply tank, a rim-spray rinsing tank and two autoclave type sealing tanks. Each unit is complete with dual vacuum system, heating elements, motor-driven agitator and fully automatic electronic controls. In the standard design, both autoclaves are supplied by the same sealant tank. A special modification, having a separate supply tank for each sealing tank, is available for applications requiring double impregnation processing.

The new units have a complete electrical interlock system to protect both equipment and operator. Features include torque control to insure sufficient and uniform tightening of autoclave cover clamp bolts, vacuum pump protective devices and a light that indicates a safe autoclave pressure condition for cover removal. Electrical, mechanical, pressure or thermal failure causes automatic shutdown. After a malfunction has been corrected, a safety-cycle button initiates a short emergency cycle that clears automatically.

Circle No. 207 on Reader Servce Card

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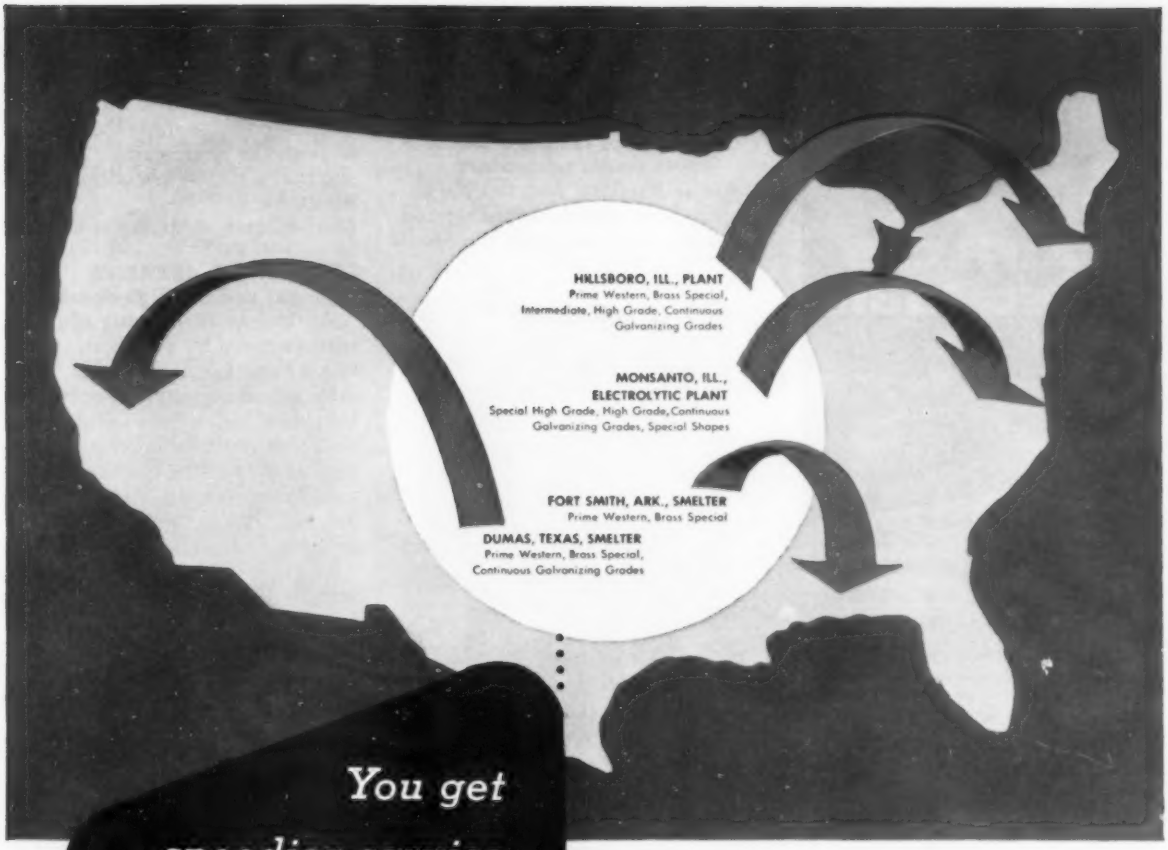

HILLSBORO, ILL., PLANT
Prime Western, Brass Special, Intermediate, High Grade, Continuous Galvanizing Grades
MONSANTO, ILL., ELECTROLYTIC PLANT
Special High Grade, High Grade, Continuous Galvanizing Grades, Special Shapes
FORT SMITH, ARK., SMELTER
Prime Western, Brass Special
DUMAS, TEXAS, SMELTER
Prime Western, Brass Special, Continuous Galvanizing Grades

You get speedier service from the ZINC ZONE

Central location of American Zinc plants assures prompt deliveries of slab zinc to any point in the nation.

PRODUCERS OF

ALL GRADES OF SLAB ZINC
ZINC ANODES (Plating & Galvanic)
METALLIC CADMIUM
SULPHURIC ACID
LEAD-FREE and LEADED ZINC OXIDES
ZINC CARBONATE
GERMANIUM DIOXIDE
AGRICULTURAL LIMESTONE
CRUSHED STONE

American Zinc sales Company

Distributors for AMERICAN ZINC, LEAD & SMELTING COMPANY

Columbus, Ohio • Chicago • St. Louis • New York • Detroit • Pittsburgh

For more information circle No. 6 on the Reader Service Card

Thousands of extra pours per ladle, with less effort for the operator
the Spincraft STAINLESS STEEL ladle
for non-ferrous metal pouring
LIGHT
TOUGH
LONGER-LASTING

If you pour non-ferrous alloys, Spincraft ladles will save you replacement costs and make the job much easier. Designed to reduce operator fatigue by their lightness, balance, and non-spill shape, they resist burning-through as only stainless steel with its high critical melting point can do. Spincraft ladles come in 23 sizes, from ¼ lb. to 30 lb. molten metal capacity.

- 75% lighter than cast iron ladles
- Amazingly long life
- Shot-blasted for coating adhesion
- Deep conical form makes pouring easier, minimizes spillage
- Can be used for zinc and other metals without coating
- "Whack proof" handle arc-welded to reinforced cup edge
- Built to last longer, work lighter. Let your operator use one, then try to take it away from him!

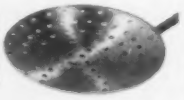
Complete handle on ¼ lb. through 9 lb. size; 10 through 30 lb. size has handle bracket stub to which proper length handle can be attached.

Also...Spincraft STAINLESS STEEL Skimmer

A skimmer that really skims! Shallow radius skims surface impurities instead of ladling as deeper-cupped skimmers do. Correct size holes prevent clogging. Short handle stubs fit common pipe and permit attachment of length and type handle you want.

IN FOUR DIAMETERS: 6 inch, 8 inch, 10 inch, 12 inch.

Spincraft ladles and skimmers are also available in low-cost mild steel.



Spincraft — STEEL WILL DO IT — INCORPORATED

Write for complete data and prices today.

SPINCRAFT, INC.
4138 West State St., Milwaukee, Wis.

Send us complete information on:

Stainless Steel	Mild Steel
☐ Ladles	☐ Ladles
☐ Skimmers	☐ Skimmers

Company .....

Address .....

City ..... State .....

Name .....

For more information circle No. 47

NEW PRODUCTS

continued from page 56

MULTIPLE-BARREL FINISHING UNIT

. . . combines tumbling machine with media separators

Easier handling and flexible capacity for tumbling, deburring and polishing are claimed for the Model DLX Finishing Unit from Rampe Mfg. Co. The 2.2 cu ft. machine offers two or three compartments and 12 to 36 rpm variable speed drive. The enclosed cabinet has a built-in reciprocating screen separator and a one cu. ft. hopper pan for fast handling of work-pieces and media. A drainage outlet can be connected to existing drains.

Circle No. 218 on Reader Service Card

STEEL SHOT ABRASIVE

. . . has uniform high density

A steel blast cleaning abrasive, manufactured by Pangborn Corporation has a narrow hardness range, extreme uniformity, density and toughness. The New Rotoblast steel shot provides improved cleaning quality, faster cleaning speeds and lower production costs in foundry, forge, descaling, maintenance and finishing operations.

Made of highest quality electric furnace alloy steel, the new abrasive is shotted by a vacuum cast method which provides greater density and eliminates voids and defects. The shot is then heat treated in a controlled atmosphere. Available in standard S.A.E. sizes.

Circle No. 219 on Reader Service Card

Zinc and Aluminum Die Castings combined furnish a useful kitchen meat grinder.

The zinc die casting supplies weight and can be finished to paint or chrome.

The aluminum die casting supplies the corrosive resistance with finish from dull to bright.

Federal DIE CASTING COMPANY
2220 NO. ELSTON AVE. CHICAGO 14, ILL.
Phone AR-6-4003

For more information circle No. 21 on the Reader Service Card

PORTABLE ELECTROPLATER
. . . is fully automatic

New models of the Jet Plater, manufactured by Sel-Rex Corporation, measure only 34″ x 28″ x 33″ and contain all equipment necessary to perform barrel or rack plating on a mass-production basis. Any cold alkaline solution, and most acid plating solutions can be used.

A stainless steel, canned turbine pump, in conjunction with a vinyl,

jet orifice manifold at the bottom of the plating tank, causes the plating solution to swirl constantly around the work, assuring smooth, even deposits. In operation, the solution is continuously drawn from the bottom of the tank, circulated through the pump and built-in filter, and returned to the tank under pressure.

Circle No. 209 on Reader Service Card

DIE LUBRICANT
. . . lowers costs

A new die lubricant that prevents metal-to-metal contact and eliminates stickers and toxic fumes has been developed by Harry Miller Corp. Called HAMICOTE, the product is an amber, medium body liquid that disperses in plain water in any ratio of dilution to form uniform, white stable emulsions. Composed of extreme pressure lubricants plus metal in soluble form, it contains no silicones, manganese, copper, graphite, or suspended matter and is non-toxic. HAMICOTE does not form scale or sludge around machines, and lowers costs by increasing die life and eliminating down time for cleaning.

Circle No. 210 on Reader Service Card

Continued on page 61

For more information circle No. 40 on the Reader Service Card

is yours when you specify

DIE CASTINGS by MILWAUKEE

Yes, the folks at Milwaukee have learned a lot in these many years of continuous service to industry in the design and production of die cast components for all kinds of products. When you come to Milwaukee for your die castings, their experience is yours at no extra cost. Backed by the facilities of its modern plant, Milwaukee offers you Complete Die Casting Service to help you realize more fully than ever, *all* of the benefits of the die casting process.

Milwaukee operates under the Certified Zinc Plan of the American Die Casting Institute.

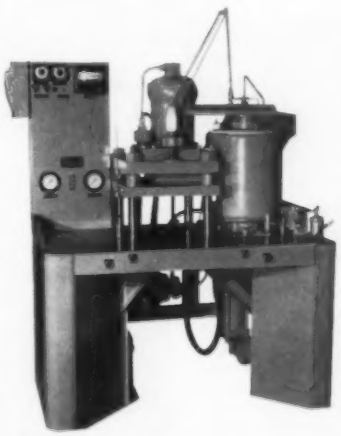
MILWAUKEE DIE CASTING COMPANY

4146 N. HOLTON STREET • MILWAUKEE 12, WISCONSIN

Established 1909

LEYDEN WAX INJECTORS

Completely Hydraulic • *Three Models Available*



Over 200 machines in the field have proved their superiority. Write for complete specifications and features of the Leyden Models vertical platen—side or center injection—horizontal platen—center injection.

LEYDEN wax injection machines are the last word in the field of wax injection. They are the result of years of research and experience.

SOME EXCLUSIVE FEATURES

- Completely hydraulic—operated by self-contained power unit.
- Two hydraulic pumps—one for clamping and one for injection.
- Clamp and injection pressure independently adjustable.
- Entire wax unit heated by circulating oil.
- Thermostatically controlled, electrically heated nozzle—optional.
- Temperature controlled to plus or minus ½° F.
- Agitator spans full diameter of the pot, keeping wax mixed uniformly.
- Universal movement of nozzle to facilitate misaligned dies.

LEYDEN HYDRAULICS, INC.

1800 North River Road • Melrose Park, Illinois

For more information circle No. 33 on the Reader Service Card

ELECTRIC MELTING

continued from page 31

at the proper casting temperature. This usually is in the range from 1140° F to 1200° F, according to the casting to be produced. As in the melting units, temperature is controlled automatically and generally held within 5° F. As a rule, temperature is kept as low as possible to obtain a good casting and to promote longer die life. High temperatures tend to give trouble with sticking of metal to the dies, while low temperatures may prevent the die from filling properly. Thus, close temperature control is imperative to obtain continuous high quality castings and a maximum production rate.

As in the melting units, the induction holding furnaces will maintain essentially clean metal, as there are no combustion products and no iron pickup which, in fuel fired units, often is due to local overheating of pots. In the induction furnaces, a small amount of flux is added only once per shift.

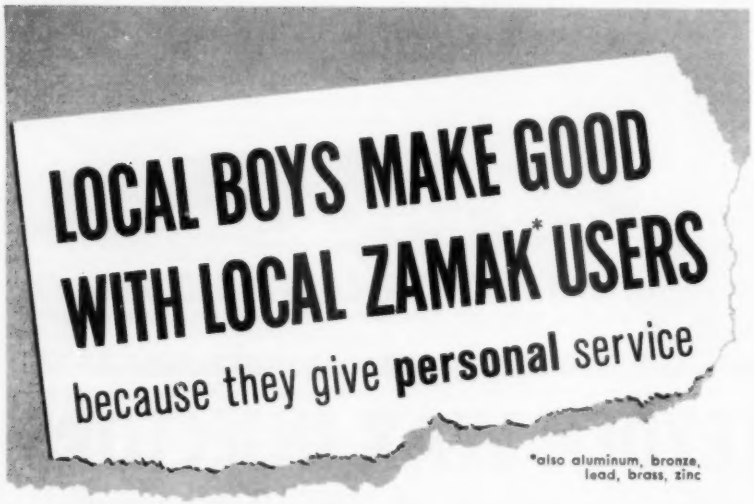
Metal is transferred from the holding furnace to the die casting machine by hand ladle. For this purpose, the units are located as close to the cold chamber as possible. Operators can stand close to the furnace without discomfort as heat is generated only within the metal itself and the unit is well insulated.

As the cycling of the die casting machine is automatic and the operator merely has to press the die closing and injection buttons, there is time for him to trim castings at a trim press set close to the casting machine. When a casting is ejected from the die, the operator places it on a table to cool and then starts the new casting cycle. While this is in progress, he performs the trimming operation and deposits casting and scrap in the respective containers. In this way, a maximum saving in time is accomplished.

ZINC MELTING FURNACE.

A minor portion of the operation at this plant is devoted to the die casting of small zinc parts for carburetors. Two Reed-Prentice gooseneck casting machines with submerged plungers are used. These machines produce good castings at the high rate attainable with zinc. Zinc, with its lower melting point, does not seriously attack the submerged plunger as would aluminum. Cost advantages are obtained with zinc die castings when castings are small, as in this installation.

All zinc melting is being done in a 100 kw Ajax induction furnace. Special high purity zinc slabs are melted and alloy hardener added. Gates, sprues, and other return metal also form part of the charge. All metal is carefully weighed on the scale adjacent to the furnace to obtain correct composition. Melting zinc in this furnace provides the same advantages mentioned when melting aluminum and the furnace is of similar design. Fluxing is kept to a minimum and metal losses are very small. Tilting is by chain hoist, and metal transfer again accomplished by means of a bull ladle mounted on a fork lift truck. Gas fired holding pots are used at the casting machines.



At HB&S you can

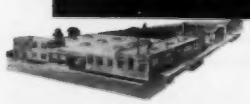
- **pick up the phone and get the answer to your questions on the spot**
- **call an order in for same day shipment, in an emergency**
- **receive palletized delivery to any point within your plant and the many other big little things that help you produce a better product at lower costs.**

At HB&S you get big-order, big company attention. Service is individualized to fit **your** needs . . . alloys specifically **engineered** to meet **your** requirements.

See what a difference HB&S service . . . HB&S quality make:
Spectrographic analysis of all production
Alloy number on every ingot
Heat number on every pallet
Start-to-finish quality control for alloys
100% on spec.
And yours for the asking
Henning's Pocket Guide to Better Casting

Write TODAY for your copy of "Die Casting with Zinc Alloy" explaining the factors influencing the production of sound castings and the causes of faults and defects.

HENNING BROS. & SMITH, INC.



91-117 Scott Ave., at Randolph St., Brooklyn, N. Y.
Smelters and refiners of aluminum, bronze, brass, zinc, lead
Dependable service since 1922

For more information circle No. 26 on the Reader Service Card

NEW PRODUCTS—
continued from page 59

ULTRASONIC DRILL
. . . cuts brittle materials

Developed by Gulton Industries, Inc., the Glennite U-602 is designed for the rapid drilling of intricate shapes into materials such as glass, ceramics, quartz, precious stones and other materials such as tungsten, carbide, silicon and germanium. Where a number of small, closely spaced holes are to be drilled, a tool can be made to position and drill them simultaneously in one operation.

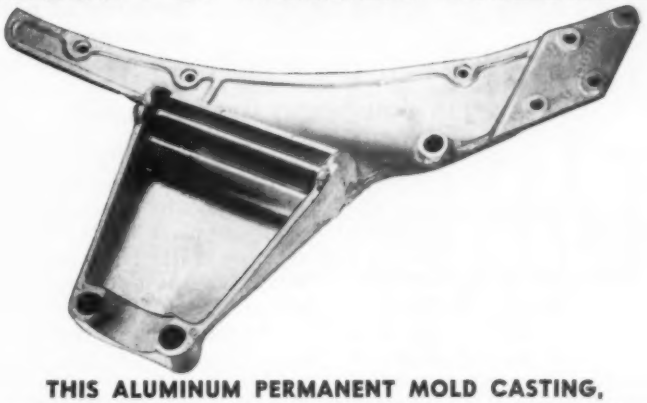
The U-602 includes two basic units; a drill assembly and an ultrasonic generator. The drill assembly consists of a special Glennite piezoelectric transducer coupled to a tool mount by a mechanical transformer, and a drill mount and automatic, adjustable feed mechanism.

Operating on a frequency of 20 kc to 22 kc, the transducer and impedance matching system provide high cutting speeds with a minimum of power. Maintenance is negligible, and standard, low cost vacuum tubes are employed.

Circle No. 211 on Reader Service Card

For more information circle No. 20 on the Reader Service Card

40000 PSI TENSILE STRENGTH



THIS ALUMINUM PERMANENT MOLD CASTING, a support for a highway luminaire under heavy stress, has an ultimate tensile strength of 40,000 psi. It was cast by Eastern to extremely close tolerances, from new high purity 356 alloy. Coring all holes eliminated machining entirely.

Combined quality and economy in a casting results from a unique combination of assets. At Eastern Casting Corp., years of diversified foundry experience are coupled with the most modern facilities obtainable . . . the results are metallurgically sound castings which meet a wide range of requirements.

We Welcome Your Inquiries

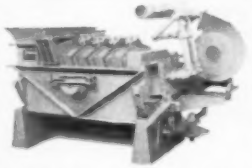
EASTERN CASTING CORP. DIVISION
THE EASTERN MALLEABLE IRON CO.
64 SOUTH WILLIAM STREET, NEWBURGH, NEW YORK

For Finer, Faster Castings

STROMAN FURNACES

Melting Brass, Bronze, Aluminum, Magnesium or any other non-ferrous metal? Are you Sand Casting, Die Casting, Billet Casting, Permanent Molding, Extruding or Forging? If so, Stroman is your natural source for melting furnaces . . . for Stroman builds only the finest, fastest melting, most economical, longest lasting and of course the most modern furnaces to melt any metal.

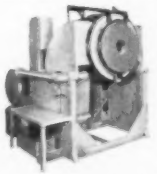
Illustrated are just a few of the various models available. A letter will bring Bulletin No. 150 which illustrates the complete line . . . or better yet let a Stroman Metallurgist consult with you on their application in your plant.



STROMAN "JC" TILTING TYPE FURNACES FOR MELTING BRASS. Fastest Melting . . . from 15 minutes up . . . lowest fuel consumption . . . always perfect metal for castings . . . capacities from 400 pounds to largest requirements.

STROMAN REVERBERATORIES for the melting of Unlimited Capacities of Aluminum, Zinc or Brass. Excellent for Smelters or Billet Casters.

STROMAN "RF" BARREL TYPE POWER TILT FURNACE for Brass, Aluminum, Iron and various smelting operations. Sizes range up to 20,000 pounds brass.



STROMAN STATIONARY LIP POUR CRUCIBLE MELTING FURNACES . . . MECHANICALLY OR HYDRAULICALLY TILTED. For brass, bronze, aluminum and other non-ferrous metals. Made in sizes from No. 60 to No. 1000 crucible.

STROMAN IRON POT AND CRUCIBLE STATIONARY DIP-OUT FURNACES FOR MELTING AND HOLDING. For Aluminum, Lead, Zinc and other white metal alloys. Rugged construction with ample combustion room to prevent direct impingement of flame on pot. Available with or without hoods.

STROMAN MANUAL TILT CRUCIBLE MELTING FURNACE. The old standby for melting Brass, Bronze, Aluminum and other alloys with capacities from No. 30 to No. 600 crucible. Real lasting construction and new gear box makes tilting so easy.

STROMAN FURNACE & ENGINEERING COMPANY
9900 FRANKLIN AVENUE, FRANKLIN PARK, ILLINOIS

For more information circle No. 57 on the Reader Service Card

NEWS OF INDUSTRY & ASSOCIATIONS

activities of people, companies & groups in the precision metal molding industries

YALE & TOWNE SELLS POWDERED METALS PLANT

The sale of its powdered metal fabricating facility in Franklin Park, Ill. to AMERICAN POWDERED METALS, INC. has been announced by The Yale & Towne Mfg. Co.

The new plant will, presumably, be operated as a mid-west facility in addition to the installation at North Haven, Conn. Over-all direction of the two plants will be under American Powdered Metals present officers, Gerald G. Fellows, president and James G. Struble, vice president. Henry S. Shroka will be in direct charge of the western division for the company.

Present plans are to maintain the Franklin Park sales organization, key management personnel and the experienced production workers.

The sale included the good will, inventory, production equipment, trademark and patents. It did not include Yale's Addison, Ill. plant and facilities for making ferrite and other magnetic components.

U.S. BRONZE POWDER WORKS TO EXPAND

Mr. F. H. Mulligan has joined the U. S. BRONZE POWDER WORKS, INC. as marketing expert for the newly developed line of metallurgical powders that the company has developed.

F. H. Mulligan

The new powders for the manufacture of sinterings will be copper, brass and copper base alloys. These will be in addition to the dendritic electrolytic copper powder that the company has marketed for several years.

PLAN EARLY COMPLETION OF IRON POWDER PLANT

The target date for completion of the 50-ton per day iron powder plant announced several months ago by the ALAN WOOD STEEL CO. has been re-scheduled, and it is anticipated that production will be started early in 1959.

RICHARDS TOOL & MOLD CO. INSTALLS CASTING MACHINE

To enable them to check die casting molds under actual operating conditions and save their customers money, the RICHARDS TOOL & MOLD CO. has installed a die casting machine in their own shop. The machine is equipped with a special attachment to accommodate all Master Mold cavity blocks.

With the new equipment all cavities cut by the company will be checked under actual production conditions. By detecting, before shipment, such troubles as mismatch, gating, dimensional errors, etc. there will be a material dollar saving to the customers.

SINGER MFG. CO. SETS UP NEW DEPARTMENT

A new department to investigate new materials, new processes and new techniques in the manufacture of household and industrial sewing machines and other company products has been set up by the SINGER MFG. CO.

Production methods in the foundry field to be studied are sand casting, shell mold casting, permanent mold casting and the carbon dioxide process for curing molds. Other fields of investigation will be plastics and adhesives, organic finishing of metals and plastics, investment casting, powder metallurgy and surface coatings.

BRADFORD H. ARTHUR JOINS PRUFCOAT LABS.

Bradford H. Arthur has been appointed assistant to the president of PRUFCOAT LABORATORIES, INC., Cambridge, Massachusetts. He was

Bradford H. Arthur

formerly Manager of Marketing and Technical Service at Metal Hydrides Incorporated, Beverly, Massachusetts. Prufcoat Laboratories Incorporated manufacture corrosion-resistant coatings of special synthetic resins.

ASTE ELECTS NEW OFFICERS

The board of directors of the AMERICAN SOCIETY OF TOOL ENGINEERS has announced the election of its new officers for 1958-59. Officers are: President, George A. Goodwin, works manager, Master Electric Co.; Vice president, Wayne Ewing, president, Arrowsmith Tool & Die Co.; Vice president, H. Dale Long, president Scully-Jones & Co.; Vice president, David A. Schrom, plant superintendent, York Div., Borg-Warner Corp.; Treasurer, Philip R. Marsilius, vice pres., Producto Machine Co.; Secretary Charles M. Smillie, president C. M. Smillie Co.; Executive secretary, Harry E. Conrad; As'sn. executive secretary, Allan Ray Putnam.

PMM OPPORTUNITIES

jobs & equipment

Opportunities rates: $20 for the first column-inch; $15 for each additional column-inch payable in advance. To answer box number advertisements, address responses to the box at Precision Metal Molding, 812 Huron Rd., Cleveland 15, Ohio. Closing date: 1st day of month preceding publication.

POSITION WANTED

EXPERIENCED die casting superintendent or general foreman. 25 years all phases zinc and aluminum. 15 years in supervision, 10 years as die casting superintendent. Size and location immaterial. Box No. 7158.

POSITIONS OPEN

DIE CASTING DIES and plastic mold salesman wanted. Key areas outside of Chicago open. Commission basis. Box No. 7258.

DIE CAST MAN—Design background with experience in supervision of Die Room, also broad experience in foundry. Relocate in Miami, Florida. Send complete resume' of experience and education to Box No. 7358.

CHICAGO HARDWARE EXPANDS FOUNDRY

Production facilities for the manfacture of non-ferrous castings at CHICAGO HARDWARE FOUNDRY CO. are being expanded.

The expansion program, a three stage affair, contemplates a completely new, integrated unit for casting and processing non-ferrous castings from receipt of ingot to shipment of the finished product.

The company is also proceeding with improvement plans for ductile iron, shell molding and shell core facilities. The machining division is also being modernized and thus far has added a new Warner-Swasey five-spindle automatic chucking lathe to drill, bore, turn, tap and thread production castings.

NATIONAL-U.S. RADIATOR APPOINTS NEW AD DIRECTOR

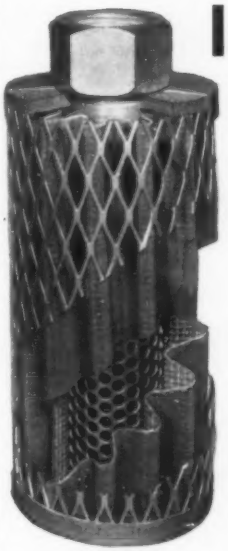
George O. Gould is the new director of advertising for the NATIONAL-U.S. RADIATOR CORP.

Mr. Gould will operate from the national headquarters of the Corporation in Johnstown, Pa. He will direct advertising for all divisions of the company.

For Dependable Protection On Die Casting Industry's Equipment

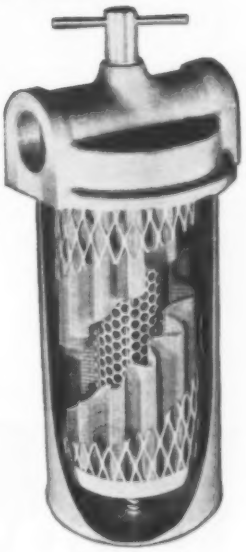
MARVEL SYNCLINAL FILTERS

Meet J.I.C. Standards



SUMP TYPE (cutaway)

OVER 800 Original Equipment Manufacturers now install MARVEL SYNCLINAL FILTERS as Standard Equipment



LINE TYPE (cutaway)

Hydraulic Oils MUST BE CLEAN to Protect Equipment— Increase Production— Reduce Maintenance

PRODUCTION ENGINEERS and MAINTENANCE MEN, whose job it is to keep production machinery operating at peak efficiency, are specifying Marvel Synclinal Filters on new equipment and standardizing with Marvels throughout their plants.

It's The ACTIVE Filtering Area That Counts!

The Synclinal design of Marvel Filters provides that all-important balance between maximum ACTIVE filtering area and sufficient storage capacity for filtered out particles. Thus, longer periods of productive operation are attained before filter cleaning is necessary. Marvel Synclinal Filters are easy to clean because both the sump and line type may be disassembled, thoroughly cleaned and reassembled in a matter of minutes. Line type operates in any position and may be serviced without disturbing pipe connections.

A SIZE FOR EVERY NEED

Available for sump or line installation in capacities from 5 to 100 G.P.M. Greater capacities may be attained by multiple installation (as described in catalog). Choice of Monel mesh sizes range from coarse 30 to fine 200.

IMMEDIATE DELIVERY

Catalogs contain dimensional charts and complete engineering data making it easy to order a filter for your specific requirements and get Immediate Delivery.

For further information write, wire, phone or use coupon below

Catalogs containing complete data available on request

MARVEL ENGINEERING COMPANY
7227 N. HAMLIN AVE.,
CHICAGO 45, ILLINOIS
Phone: JUNIPER 8-6023

Without obligation, please send me complete data on Marvel Synclinal Filters, as indicated—

- ☐ Catalog #105—For Hydraulic Oils, Coolants Lubricants.
- ☐ Catalog #200—For Fire-resistant Hydraulic Fluids (Aqueous Base)
- ☐ Catalog #400—For Fire-Resistant Hydraulic Fluids (Synthetic).
- ☐ Catalog #301—For Water

PMM-7

Name .....

Company .....

Address .....

City .....

State .....

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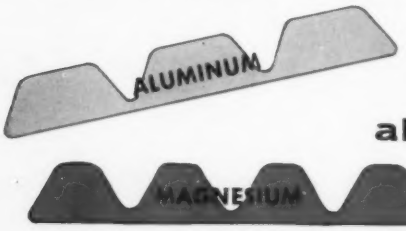

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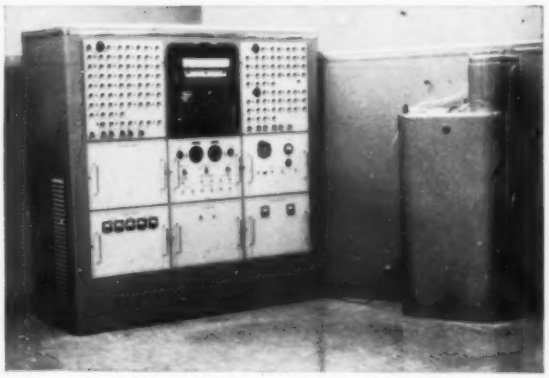

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